DOCUMENT RESUME

ED 296 699	IR 013 271
TITLE	Information Resources Management: Systems Communicating with Systems. A Session Especially Designed by Senior Managers for Senior Management Officials. Viewgraphs and Presentations. Intensive One-Day Symposium (Gaithersburg, Maryland, December 3, 1987).
INSTITUTION	General Services Administration, Washington, D.C.; National Bureau of Standards (DOC), Washington, D.C.
PUB DATE	22 Feb 88
NOTE	203p.
PUB TYPE	Collected Works - Conference Proceedings (021) -- Reports - Evaluative/Feasibility (142)
EDRS PRICE	MF01/PC09 Plus Postage.
DESCRIPTORS	*Computer Networks; *Computer Software; Computer System Design; Database Management Systems; Data Processing; *Federal Government; *Information Technology; *Management Information Systems; Office Automation; *Standards

ABSTRACT

Summaries of the welcoming and opening remarks for a symposium on the standards issues that will affect the federal government's planning, acquisition, and use of integrated computer and telecommunications systems over the next five years set the stage for the keynote address by Joseph Timko of IBM entitled "Standards--Perspectives and Evolution." Notes, outlines, and/or viewgraphs used by individual presenters in the two sessions of the symposium are then provided. Six presentations and a panel discussion in the first session examined issues related to the interconnection of large systems, including discussions of the open system interconnection, the government open systems interconnection profile (GOSIP), the integrated systems digital network (ISDN), local area networks, computer aided logistics support (CALS), and electronic data exchange. The six presentations and panel discussion in the second session focused on issues related to making incompatible applications communicate, or software portability. Individual presentations examined office document architecture and interchange, the distributed office applications model, operating systems standards, database management systems, standards for the evaluation and selection of distributed database applications, and a user's perspective of the standards process. A summary of the closing remarks and a list of attendees conclude the report. (EW)

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Information Resources Management:

Systems Communicating With Systems

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A Session Especially Designed by Senior Managers for Senior Management Officials

Intensive One-Day Symposium

▶ *National Bureau of Standards*

Gaithersburg, Maryland
December 3, 1987

Viewgraphs and Presentations

Sponsored by:

General Services Administration,
Information Resources Management Service
and
U.S. Department of Commerce,
National Bureau of Standards

IR013271

UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Gaithersburg, Maryland 20899

February 22, 1988

To: Attendees at the "Systems Communicating with Systems"
Symposium

Attached are copies of the slides and viewgraphs that were presented at the December 3, 1987 symposium, "Systems Communicating with Systems."

We appreciate the participation of the speakers and the attendees who contributed significantly to the success of our program. Our goal was to exchange information on the major standards issues that will affect the Federal government's planning, acquisition and use of integrated computer and telecommunications systems over the next five years. We welcome your ideas on issues that should be discussed in future exchanges.

Shirley M. Radack	William Rinehuls SC
Shirley M. Radack National Bureau of Standards Technology Building - B151 Gaithersburg, MD 20899 (301) 975-2833	William Rinehuls General Services Administration 18th & F Streets, N.W. Washington, DC 20405 (202) 566-1180

Attachments

AGENDA

GSA/NBS SYMPOSIUM
INFORMATION RESOURCES MANAGEMENT: SYSTEMS COMMUNICATING WITH SYSTEMS

A session especially designed by senior managers for senior management officials

December 3, 1987
National Bureau of Standards
Gaithersburg, MD

8:30 am	**REGISTRATION AND COFFEE**
9:00 am	**WELCOME** James Burrows Director, Institute for Computer Sciences and Technology National Bureau of Standards
9:10 am	**OPENING REMARKS** Frank Carr Commissioner Information Resources Management Service General Services Administration
9:20 am	**KEYNOTE ADDRESS** Joseph Timko Vice President, AT&T Architecture Bell Laboratories
9:50 am	**PROGRAM INTRODUCTION** Shirley Radack Institute for Computer Sciences and Technology National Bureau of Standards William Rinehuls Information Resources Management Service General Services Administration

SESSION I - INTERCONNECTING LARGE SYSTEMS

The major technology advancements which will aid you to plan the integration of incompatible telecommunications, network technology, and ADP equipment.

A - CURRENT SYSTEM ISSUES

OSI", "ISDN" and "GOSIP" are the current buzzwords in networking technology. What are they? What problems are they solving? How can they help you?

Session Chairman: Kevin Mills
Chief, Systems and Network Architecture Division
NBS

10:00 am **Open Systems Interconnection**

The Open Systems Interconnection approach has been widely acknowledged as the key to improved connectivity of systems and networks. What is it? What does it do for you?

Joseph S. De Blasi
Director of Standards
IBM Corporation

Government Open Systems Interconnection Profile (GOSIP)
Using the OSI approach, what has the Government done to develop a specification for Government OSI procurements?

Kevin Mills
NBS

Integrated Systems Digital Network (ISDN)
Widely heralded as the real long-range solution to the problems of voice, data and video interchange, what is it? When will it be here?

John Robertson
Head, Network Architecture Planning Department
AT&T Bell Laboratories

11:00 am **COFFEE**

11:20 B - EMERGING NETWORK ISSUES

What are emerging network issues? How is that technology being put into to practical use today by senior systems managers?

Local Area Networks
What is happening in local area network technology and standardization to help you plan for future network acquisitions?

Gary Robinson
Manager, Corporate Standards
Digital Equipment Corporation

Computer Aided Logistics Support (CALS)
One integrated approach, using a variety of standards, to support a complex Government logistics function. How can this approach benefit you in your organization?

Bruce Lepisto
Office of Secretary of Defense

Electronic Data Interchange
What is this technology and how can it help you solve ADP and telecommunications data interchange problems?

Ben Milbrant
EDI Manager
Navistar Corporation

12:20 pm **PANEL DISCUSSION**

Speakers from Sessions IA and IB with audience interaction

1:00 pm **LUNCH (NBS Cafeteria)**

SESSION 2 - MAKING INCOMPATIBLE APPLICATIONS COMMUNICATE - SOFTWARE PORTABILITY

The major system advances that are enhancing software portability as an aid to making applications communicate. What are recent advances in office applications and how are they being put to use in the Government today?

Session Chairman: Lawrence Welsch
Office Systems Engineering Group
NBS

2:00 pm **Office Document Architecture and Interchange**

What are the real problems in document transfer?
What are the possible solutions?

Lawrence Welsch
NBS

Distributed Office Application Model
What is it? How will it help solve the problems of office computer incompatibility and allow different manufacturers products to run in the same system?

Robert Christie
Manager, Technology and Publications Products
Control Data Corporation

Operating Systems Standards
Is POSIX the final solution to having an standard operating system environment? What exactly is POSIX? a new operating system? an operating system "interface"? What does that mean?

Roger Martin
Software Engineering Group Leader
NBS

Data Base Management Systems
First there were no DBMS standards and every Agency had its own; now there are two with more on the way. Why do we need so many? Are some better than others?

Donald Deutsch
Manager, Technology Development
GE Information Systems

3:20 pm **COFFEE BREAK**

3:35 pm **Distributed Data Base Applications**

What standards should be considered in evaluating and selecting products for distributed data base applications?

Chris Reedy
Computer Corporation of America

A User's Perspective of the Standards Process
What does the user really need? Does the process respond to user requirements.

Joanna Vanderwilt
Boeing Commercial Airplane Company

4:15 pm **PANEL DISCUSSION**

Speakers from Session II with audience interaction

5:00 pm **CLOSING REMARKS**

Frank Carr

5:15 pm **ADJOURN**

JAMES H. BURROWS

James H. Burrows is the Director of the Institute for Computer Sciences and Technology, National Bureau of Standards, Department of Commerce. He manages a program of research and technical support to government and industry in the effective application of computer technology.

From July 1972 until May 1979, Mr. Burrows was the Associate Director for the Office of Computer Resources, U.S. Air Force.

Prior to 1972, Mr. Burrows directed the development of large information systems and data management projects for the MITRE Corporation and the Lincoln Laboratory in Massachusetts.

His professional activities include memberships in the Association for Computing Machinery, the Institute for Electrical and Electronics Engineers, the American Association for the Advancement of Science and the Data Processing Managers Association.

Mr. Burrows is the Chairman of the American National Standards Institute, Information Systems Standards Board. He was previously the Vice Chairman of that Board. He is a member of the University of Maryland Computer Advisory Board and the Committee on Computer Research and Applications of the Federal Coordinating Council on Science, Engineering and Technology. He is an past Chairman of the Federal Interagency Committee on Information Resources Management (formerly the Interagency Committee on Automatic Data Processing).

Mr. Burrows received a B.S. in Engineering from MIT in 1949 and a M.S. in Mathematics from the University of Chicago in 1951. He received the Executive Excellence Award of the Interagency Committee on ADP, the Department of Commerce Silver Medal, and the GOVERNMENT COMPUTER NEWS Annual Award for Excellence.

FRANK CARR

Frank Carr is Commissioner, Information Resources Management Service of the General Services Administration. He is an electrical engineering graduate of the University of Pennsylvania and studied business administration at the Wharton School of Finance. He was a visiting lecturer at the Massachusetts Institute of Technology's Sloan School of Management and attended the Harvard Business School's Advanced Management Program.

His career includes more than 25 years with the Westinghouse Electric Corporation where he held a variety of management positions. He was engaged in the application of Operations Research to industrial problems in areas such as forecasting, production and inventory control, warehouse location and facilities planning and was among the first to use these techniques and electronic computers in the design of management control systems.

Since July 1977, Mr. Carr has headed the automated data and telecommunication activities of the U.S. General Services Administration (GSA) where he directs and coordinates a Governmentwide program for managing, using and procuring automated data processing systems, office information systems and telecommunications services to meet Federal information processing needs.

ROBERT H. CHRISTIE

Robert H. Christie is with Control Data Corporation in Arden Hills, MN. Mr. Christie has over 15 years of background in high-speed data communications networking experience for the U.S. Government and private industry. He was a member of ANSI X4A12 Word Processing Group, and later Secretary, Vice Chair, then Chair of X3V1.4 Text Processing: Office and Publishing Systems, Text Interchange Task Group, American National Standards Institute. He has over 10 years experience working on CCITT X.25 and X.400 and ISO (MOTIS) Message Oriented Text Interchange System. He is currently Standards Representative and Division Consultant on Open Systems Interconnect for Control Data Corporation, Technology and Publications Division. His duties include managing text and graphics input into Control Data's Automated Publishing System.

JOSEPH S. DEBLASI

Joseph S. DeBlasi is Director of Standards at IBM Corporation. He was born and raised in Brooklyn, New York, where he attended public school and graduated from Bishop Loughlin High School. He received his Bachelor of Science degree in Mathematics and Physics from Virginia Tech in 1957 and has done graduate work in mathematics and physics at George Washington University and at the University of Hawaii. Prior to his entering the Air Force in 1958, he taught mathematics and physics at Bishop Loughlin High School and Manhattan College in New York. He entered the Air Force in June 1958 attaining the rank of Captain and served until February 1964.

Mr. DeBlasi joined IBM in Washington, DC, in March 1964. After becoming national representative for Rand Corporation, SDC, Aerospace Corporation, and Mitre Corporation, he became special assistant to the regional manager and DPD Vice President. He then held a number of management positions in the marketing organization including Branch Manager in Dayton, Ohio, and Milwaukee, Wisconsin. He then became manager of revenue planning and later administrative assistant to the IBM Vice President for Commercial and Industry Relations. His present position is Corporate Director of Standards which directs IBM's worldwide standards programs.

Mr. DeBlasi is a member of the Corporation Board of the Milwaukee School of Engineering and Treasurer and member of the Board of Trustees of the Hudson River Museum. Mr. DeBlasi is also a member of the Board of Directors of the American National Metrics Council and a member of the Executive Committee of the U. S.

National Committee for the International Electrotechnical Commission (IEC).

Mr. DeBlasi has also served as a member on a number of national and international standards committees. He is Chairman of the International Advisory Committee for Information Technology under the American National Standards Institute (ANSI) and Chairman of Strategic Planning Committee for Information Technology under the International Organization for Standardization (ISO), and presently heads the U. S. delegation to the ISO Committee on Information Technology.

DONALD R. DEUTSCH

Dr. Donald Deutsch is currently Manager Technology Development for G.E. Information Services in Rockville, MD. He previously managed organizations responsible for developing database and other systems software, as well as Electronic Data Interchange and Financial Clearing-House Applications in G.E.'s Nashville, TN facility.

Prior to joining G.E., Don led database standardization and supporting research programs at the U.S. National Bureau of Standard's Institute for Computer Sciences and Technology; was a full-time faculty member in the Department of Information Systems Management at the University of Maryland, College Park; and worked as a Senior Consultant for Arthur Andersen & Co.

Don has a B.S. in Systems Analysis from Miami University in Oxford, OH, and earned his M.B.A. and Doctorate in Operations Research and Information Systems at the University of Maryland. He has been an officer of the X3H2 Technical Committee on Database since its inception in 1978, serving as Chairman for the past eight years. Under his direction, this group operating under the auspices of the American National Standards Institute, developed the first database management system standards; these standards have now been approved as International (ISO) and Federal Information Processing (FIPS) as well as ANS standards.

Author of numerous articles and books, Dr. Deutsch is a frequent speaker on database technology and standardization issues.

BRUCE LEPISTO

Bruce Lepisto is currently the Deputy Director of the CALS (Computer-Aided Acquisition and Logistic Support) Policy Office, in the Office of the Secretary of Defense (OSD). He has been involved with the CALS program since its inception, and was Co-editor of the original Institute for Defense Analysis (IDA) CALS Study report that led the Department of Defense to establish the CALS program.

Mr. Lepisto is a career DoD employee with over twenty years experience in both acquisition and operational logistics. Prior to joining the OSD staff in 1984, he worked for the United States Air Force, most recently as Deputy Director for Data Management of the JLC's Joint Depot Maintenance Analysis Group (JDMAG). His Air Force professional experience includes depot posture planning, supply policy, data system design and management, and productivity and cost analysis. He is a senior member of the Society of Logistics Engineers, a member of the Steering committee of the national IGES/PDES Organization, and a member of the ANSI/ASME Y14.26 committee on Computer Aided Preparation of Product Definition Data.

ROGER J. MARTIN

Roger J. Martin is the Manager of the Software Engineering Group of the National Bureau of Standards (NBS) Institute for Computer Sciences and Technology (ICST). He is responsible for the development of software engineering standards and guidelines. Mr. Martin is also responsible for the program to (1) adopt a Federal Information Processing Standard (FIPS) for Portable Operating System Interface for Computer Environments (POSIX); (2) build an NBS POSIX Conformance Test Suite to test conformance of candidate environments to the POSIX FIPS; and (3) design an Applications Portability Architecture which will integrate standards from all the functional areas which must be addressed to promote application portability.

Previously (1976-1982) he was with the Executive Office of the President where he was manager of the group which developed and evolved the Office of Management and Budget's (OMB) Budget Status System. Mr. Martin began his Federal career (1971-1976) in the Computer Sciences Division of the David W. Taylor Naval Ship Research and Development Center.

Mr. Martin has an M.S. and B.S. in Computer Science from Iowa State University.

BEN MILBRANDT

Ben Milbrandt is presently the EDI manager for Navistar International Transportation Corporation, where he has been coordinating Navistar's electronic communication with suppliers.

Ben spent a year as a loaned executive to the Automotive Industry Action Group (AIAG) in Southfield, MI where he helped develop, edit and publish seventeen AIAG conventions to the American National Standards Institute X12 standards. He is past president of the Ft. Wayne, Indiana American Production and Inventory Control Society (APICS). He is a member of the Joint Electronic Data Interchange (JEDI) committee, worked with the United Nations Joint Electronic Data Interchange (UNJEDI) committee, has been an officer of the Accredited Standards Committee X12 and has recently published a book on EDI "Electronic Data Interchange: Making Business More Efficient".

KEVIN L. MILLS

Kevin Mills, Chief of the Systems and Network Architecture Division of the Institute for Computer Sciences and Technology, joined the National Bureau of Standards (NBS) in 1982 and established the OSI Protocol Performance Research Program. This research program resulted in international collaboration between government, industry, and academic institutions to evaluate and enhance the performance of OSI protocols. Prior to joining the NBS, Mr. Mills developed communications performance measurement products at Tesdata Systems Corporation. He performed data communication research and development for the System Development Corporation and the United States Marine Corps.

Mr. Mills received an M.S. from the American University and a B.S. from Frostburg State College.

CHRISTOPHER L. REEDY

Dr. Christopher L. Reedy received his B.S. and M.S. in Mathematics from Massachusetts Institute of Technology in 1971, and his Ph.D. in Mathematics from the University of California, San Diego in 1974. Dr. Reedy has been involved with the development of computer systems since 1967 and has been employed on a variety of projects as a computer system designer, architect, and project manager since 1975. Dr. Reedy has been employed by Computer Corporation of America (CCA) since 1985 and is currently working on implementations of heterogeneous distributed database systems as a part of prototype systems development for engineering and logistics support.

JOHN S. ROBERTSON

John S. Robertson is head of the Network Architecture Planning Department at AT&T Bell Laboratories. He is responsible for the architectural coordination of AT&T's ISDN planning and ISDN external standards representation. Mr. Robertson has degrees in electrical engineering from the University of Delaware and Stevens Institute of Technology. He joined AT&T Bell Laboratories in 1977.

GARY S. ROBINSON

Gary S. Robinson has been the Senior Manager of Corporate Standards, Digital Equipment Corporation since 1980. He is responsible for positioning and managing worldwide standards activities of Digital Equipment Corporation. He formulates standards strategies, policies, and positions for the corporation, and reports to the Vice President of Product Strategy and Architecture. He previously held positions with Datatrol, Inc., Inforex, Inc., Honeywell Information Systems, and Bell Telephone Laboratories.

He participates in many standards committees in the International Organization for Standardization, the American National Standards Institute, the Institute of Electrical and Electronics Engineers, and the European Computer Manufacturers Association. He is Vice-Chair Systems of ISO JTCI, a member of X3, the IEEE Standards Board, and the IEEE Computer Society Standards Board.

JOSEPH W. TIMKO

Joseph W. Timko is Vice President of AT&T Architecture at Bell Laboratories. His early career in Bell Laboratories included responsibilities for military system analog computers, missile guidance equation development, machine aids and graphics systems. He transferred to Bellcomm, Inc. in 1968 and served as a Director responsible for computer system studies and operations in support of NASA on the Apollo space program.

Upon his return to Bell Laboratories, he served as Director of the System Development Center in Business Information Systems Programs, responsible for design and development of the Trunks Integrated Record Keeping System (TIRKS) and the Plug-in Inventory Control System (PICS).

He served as Director of the Station Systems and Business Terminal Laboratory. He became Executive Director of the Residence Communications and Customer Services Division responsible for the design and development of all consumer telephone and terminal products. He then served as Executive Director of the Business Systems Division, responsible for Product Family System Architecture, Product Management and Application Software Systems.

In 1986, he assumed responsibilities as Vice President of the AT&T Architecture organization. The mission of the organization is to ensure that the products and services provided by AT&T are compatible and unified through an AT&T Architecture.

He currently also serves as Chairman of the Board of Directors for the Corporation for Open Systems.

JOANNA VANDERWILT

Joanna Vanderwilt works with a new group in the Boeing Commercial Airplane Company, Data Standards Management. Joanna earned a B.S. in inorganic chemistry from the University of Washington, followed by an M.S. in physical inorganic chemistry from San Jose State University. Later, a year of intensive electronic engineering studies at the University of California at Davis under the sponsorship of the National Science Foundation, with additional concurrent studies at SJSU, gave her entry to the computer industry in 1977. During her gradual shift from hardware to software, she has grown increasingly interested in standards for information systems. Joanna joined BCAC a little over a year ago after working nearly ten years in the San Jose area. She holds memberships in ACS, IEEE, ACM and SWE.

LAWRENCE A. WELSCH

Lawrence A. Welsch received his B.S. in mathematics computer science option from Carnegie Mellon University in 1970. He then went to work for RCA David Sarnoff Research until RCA went out of the computer business. Mr. Welsch went on to Rutgers University completing a PhD with a thesis in Artificial Intelligence and his thesis topic was The Automatic Synthesis of Questions. He then worked for Burroughs on the design of advanced memory systems. He left Burroughs for the world of microprocessors at AT&T, where he worked on the architecture and testing of the UNIX Microsystem. His last project at AT&T was leading the 3B4000 prototype development. He left AT&T on August 3, 1987, to become the manager of the Office Systems Engineering Group in the Institute for Computer Sciences and Technology.

Welcome

James Burrows

National Bureau of Standards

Summary of Opening Remarks

James Burrows

I am pleased to be here to welcome you to the National Bureau of Standards, and to this conference on Systems Communicating with Systems. I also would like to thank Frank Carr and his staff at the GSA for working with us in organizing this conference.

This is truly the era of the computer system; not the mainframe, but the system. Large systems enable us to do things we couldn't do previously, and these systems give power and flexibility to the user.. Users may not be able to solve all the problems working alone at PCs, despite their enthusiasm of the last several years about PCs. It's clear we're going to need distributed systems within the enterprises of the government and interconnections with cooperating systems for productive information handling.

The development of systems is a challenge both to the planner and the technician. Systems are complex; they don't stand alone. They're tied into other things. Interfaces change. Systems are composed of subsystems that must work together and with other systems. The systems must be built in such a way that they can be upgraded in part or in whole without complete replacement of all the hardware and all the procedures.

The next ten years, I think, will be critical throughout government and industry in developing and implementing the needed standards for computer systems and the needed implementations within the products. We need a coherent set of standards to exchange data, pictures, text as digital information, to achieve open architecture, multi-vendor systems and networks, and to develop and operate systems that are secure and reliable. Some of the standards that will be essential include the application profiles such as MAP, TOP and GOSIP to achieve interoperability of open systems. MAP, TOP, and GOSIP are just the beginning of what's needed. We have to go beyond the electronic messaging and file transfer applications to include graphics data exchange, office document interchange, and other applications.

The government and industry have been working together to develop consistent profiles that support distributed activity. The Department of Defense has taken an early leadership in both demonstrating prototype standards and committing to the OSI standards which are coming.

Data element standards such as the X12 standards for electronic data interchange have been around for many years. Now, it's becoming clear both to the manufacturers and to the buyers that a common system is needed, and that it's time for the government to get on board using the X12 standards.

We're going to need standards for intersystem queries and format standards for preparing messages. We're going to need data dictionary and directory standards to assist the user in finding where information is located and what it means. We'll need security standards for distributed systems. You must have ways to purge false messages, recover from outages, and restart. These are all difficult problems and we need standard ways to solve them. I think we have a full ten years ahead if we are to develop the standards that are needed.

Standards such as those I mentioned and those being discussed here today are essential if we are to make progress in our use of computer technology. The technology continues to evolve and we must work together to get the standards in place that will let us exploit the technology in our organizations. I hope you'll learn a lot here today, and I hope you'll be able to work with all of us in getting you and your organization on board for the 1990s. Thank you very much.

Opening Remarks

Frank Carr

General Services Administration

Summary of Opening Remarks

Frank Carr

What I'd like to do in the next few minutes, is to give you a perspective that will tend to be a little bit more of the perspective of managers as they look at the issue of standards.

I think it's interesting that we have such a diverse group meeting here today and that within the past thirty days we've had publications as diverse as Datamation and Business Week featuring the current problems that we have in the Federal government regarding standards and procurement of computer products. As I think about the subject I'm reminded of something that Will Rogers said, "It's not what you know that gets you into trouble, it's what you know that ain't so". In recent weeks in getting involved a little bit more in the standdards area, particularly as related to procurement, I keep running across different perceptions that people have that are incorrect. What I would like to do is to just run through a list of things to illustrate some of these things that one has to understand about standards and where they're going.

The first one is that when you ask most people what a standard is, they respond that it's something that comes out of a voluntary standards making group. But, when you get right down to it, a standard is a set of specifications that are needed to be able buy a product. Then you have to get into the issue of how do you validate that you got what you specified. That is a procurement outlook as far as specifications are concerned. The early purpose of specifications was to achieve interchangeability of parts within a single product.

Standards have a role in creating markets. When electric shavers first came on the marketplace, there were only two suppliers. They did't go into competition with each other. What they did was to get together jointly to create a market for electric shavers. Then what you had was competition between electric shavers and the blade. We have something similar going on in our area. We have the issue of competition between a standard product and proprietary products. Or, as some would say, between commodities and products that have additional value associated with them.

The Brooks Act assigned to NBS the role of establishing government standards. But what is sometimes forgotten is that the purpose of that was to achieve volume procurement. The early standards regarding higher level language compilers were not for the purpose of achieving interchangeability. The purpose was to require the government to buy standard computers. We have an executive order that says to use voluntary standards. The purpose of that particular executive order was that the government should not be buying products that have unique specifications. We should be buying commercial products.

Currently we find ourselves very much in a state of flux. We find that instead of standards being set in order to achieve uniformity within existing products that are being offered, we find standards are really specifications for future products. Then we get into the problem of the timeliness of those standards.

The standards are moving away from individual components and becoming systems oriented. Standards are becoming more of a design tool rather than strictly procurement. There are a lot of things that are changing in this area, and I think one of them is what the role of the user is in the standards making process as opposed to the role of the vendors, and the intent on the part at least of the government is for the users in government to play a larger role in establishing what standards the government will use.

There is also the issue of mandatory standards versus discretionary standards. Under the current way in which we establish standards, the standards are mandatory. Agencies must get a waiver in order to deviate from those standards. If they simply specify the standards, that satisfies the procurement regulations. However, we can establish standards which agencies may choose to use. Then if they choose to use them, there is a requirement that they justify the use of those standards. In those two cases we have on the one hand the Brooks Act as the basis for the statutory authority to do something, and in the other case we have the Competition and Contracting Act as the authority.

These are just a set of thoughts regarding standards in the changing environment that we have right now. I have the unique position in today's agenda to both start with some opening remarks, and to have some closing ones. So, at the close of today I may correct some of the things that I have said here. Thank you very much.

Keynote Address

Joseph Timko

AT&T Architecture, Bell Laboratories

Joseph Timko, Vice President
AT&T Architecture, Bell Laboratories

STANDARDS - PERSPECTIVES AND EVOLUTION

Historically, when one goes back as little as 10 - 15 years, the standards bodies were more a forum for semi-academic exercises. Typically, the participants in the standards bodies did not play leading roles in shaping their companies' or governments' information processing capability. There were some major players that effectively determined de facto standards for information networking. However, much has happened over the last decade. Information technology has exploded for both computing and telecommunications. Users have become a voracious consumer of information technology to realize operational efficiencies and to meet the demands of the marketplace. The divestiture of AT&T has replaced a powerful unifying force with multiple competing views on telecommunications directions. During this period data networking, transaction processing and information services have come of age. Today, standards are a strategic force for users, vendors and governments. Participants in the standards bodies represent their organization's strategic business directions in the standards process. Users demand standards-based, multi-vendor inter-operable systems for applications networking.

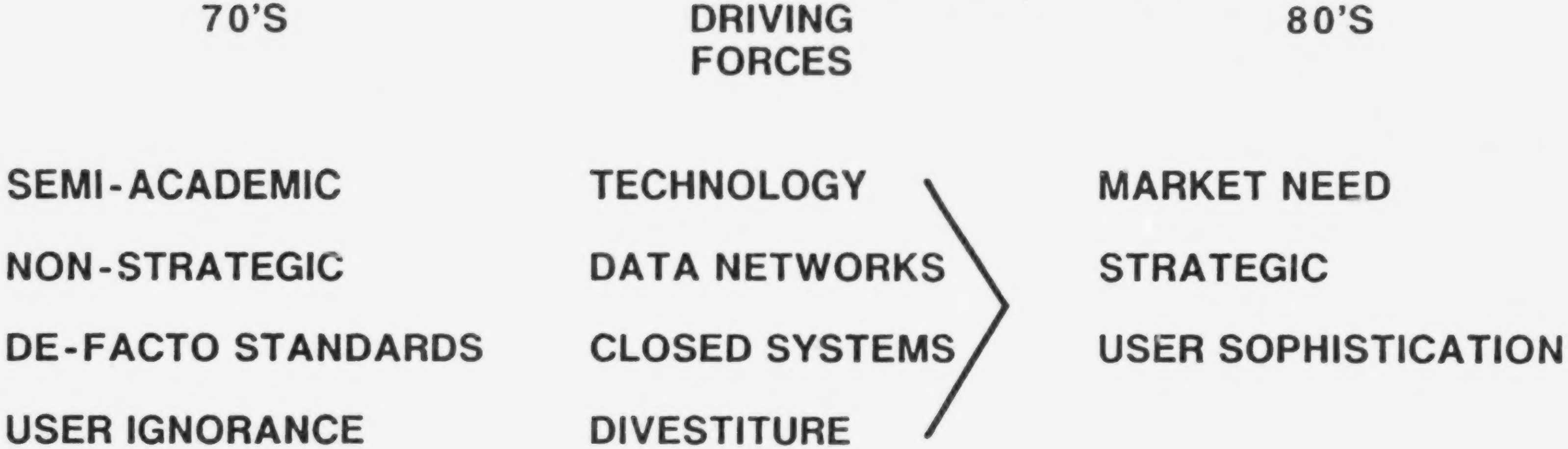
Networking standards have increased tremendously in complexity with the addition of data networking and applications networking. In comparison, the protocol architecture for voice networking is relatively simple because communicating humans can flexibly perform the functions of the OSI upper layers. Today, there are a large number of sub-network alternatives for transporting voice and data (i.e., private line, DDD, LANs, X.25 and ISDN). There is also a rich array of options and capabilities associated with the OSI upper layers, notably at the application layer, where capabilities exist for message handling, file transfer, network management, transaction processing, virtual terminals, EDI, etc.

As a result of the exploding networking complexity driven by technology and user needs, there has been a corresponding explosion in the standards world. The number of standards bodies has expanded significantly; existing major standards bodies like CCITT and ISO have significantly expanded both the scope and depth of their standards work; and the number of participants (i.e., users, vendors and governments) has also increased in dramatic fashion.

The most important perspective on the standards process is to recognize that it is the largest joint development ever undertaken. In working task groups or sub-committees of the standards bodies, design engineers from competing companies work side by side in a cooperative effort to generate development specifications for hardware and software system modules. The OSI protocol layers are development specifications that must be implemented by vendors in their various products in exactly the same way in order to achieve inter-operability. The efficiency and output of the joint development process in the standards bodies is necessarily subject to company, national, and regional competitive and political forces. These natural counter-productive forces do slow down the standards process. However, there are powerful foces that accelerate the standards process, including user and vendor consortia of various kinds like MAP/TOP, COS, SPAG, POSI and others. Of course, the major overriding objective of all participants is to work towards a global networking architecture to minimize wasted and duplicative efforts and to achieve inter-operability. Thus, there are powerful movements towards generating "harmonized" functional profiles.

The evolution of standards is driven fundamentally by market needs and user demands but the implementation is shaped by evolving information technologies. These technologies not only include basic technologies like integrated cricuits, photonics and software but also system technologies like signal processing, packet switching, computer architectures, human/machine interfaces, etc. The standards process has grown tremendously not only in the scope and depth of the work undertaken but also in terms of the strategic importance of the output to users and vendors. While one can focus on some of the shortcomings of the efforts in the standards bodies, I would rather focus on its achievements. For example, ISDN--which has been a decade in the making--is a reality and, with its evolution to broadband networking, will fulfill the vision of what we in AT&T have called Universal Information Services. The international standards movement will be the basis for the emerging information age.

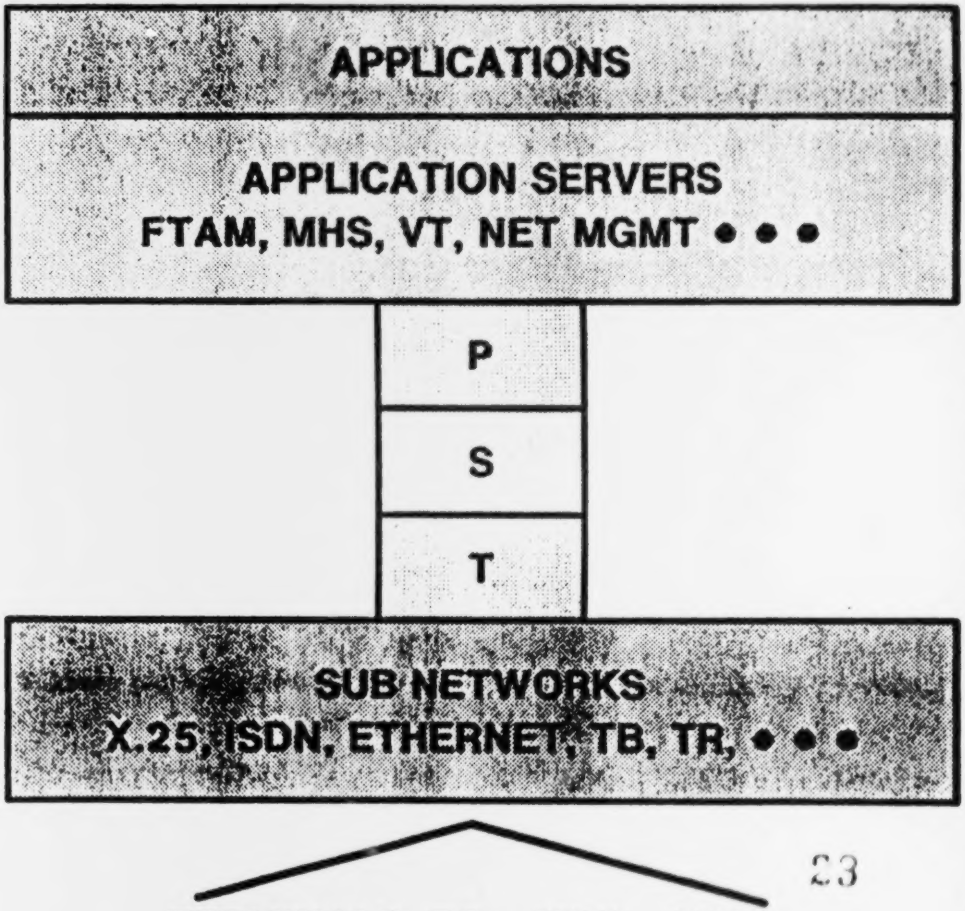
HISTORICAL PERSPECTIVE
STANDARDS EVOLUTION



70'S	DRIVING FORCES	80'S
SEMI-ACADEMIC	TECHNOLOGY	MARKET NEED
NON-STRATEGIC	DATA NETWORKS	STRATEGIC
DE-FACTO STANDARDS	CLOSED SYSTEMS	USER SOPHISTICATION
USER IGNORANCE	DIVESTITURE	

HGU75787.004

NETWORKING STANDARDS



APPLICATIONS

APPLICATION SERVERS
FTAM, MHS, VT, NET MGMT • • •

P

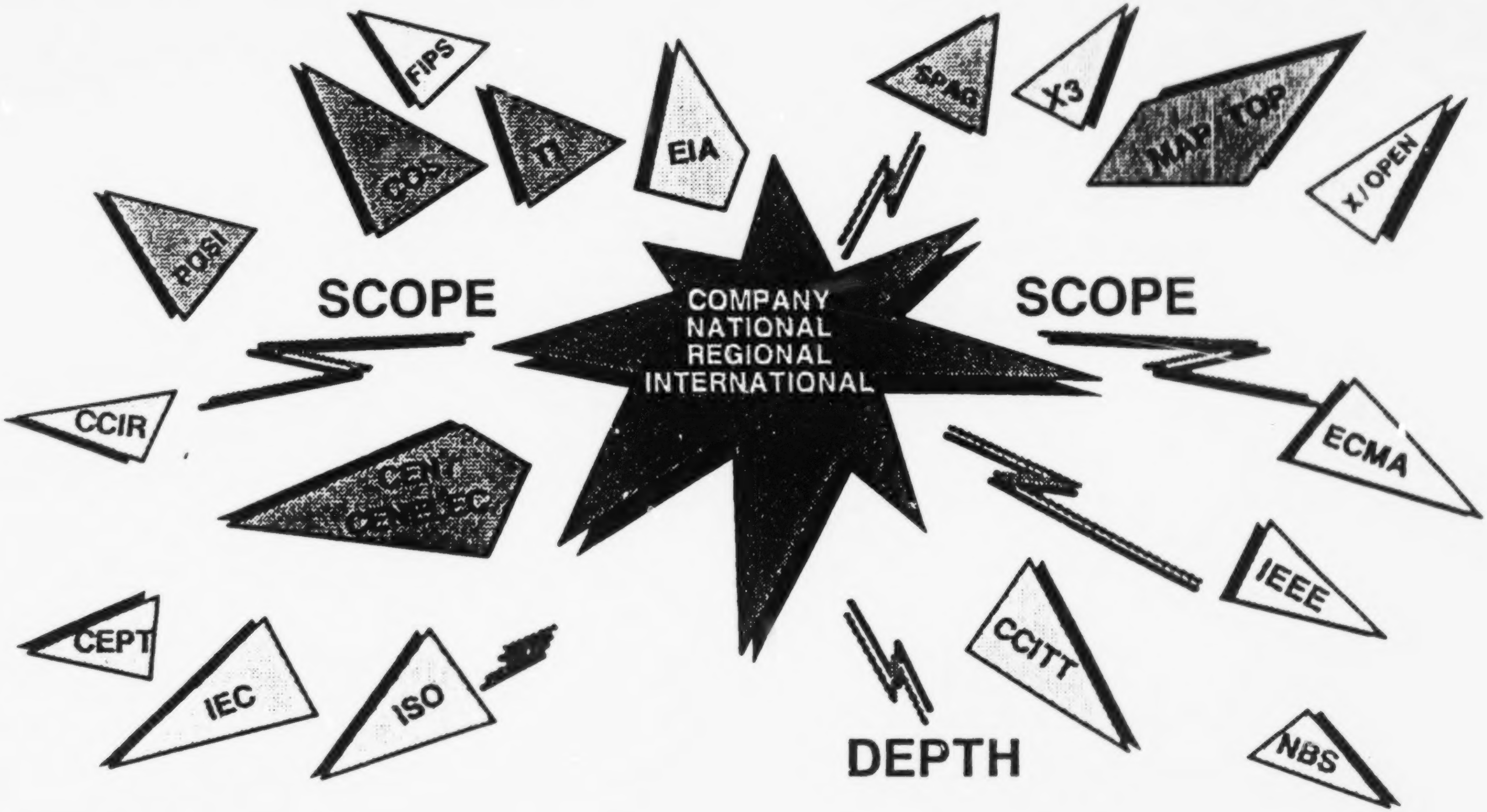
S

T

SUB NETWORKS
X.25, ISDN, ETHERNET, TB, TR, • • •

TERMINALS, PCs, MINIs, MAXIs

EXPLOSION IN STANDARDS ACTIVITIES


FIPS
COS
IT
EIA
SPAG
X^3
MAP TOP
X/OPEN
POSI
CCIR
CEN CENELEC
CEPT
IEC
ISO
CCITT
IEEE
ECMA
NBS

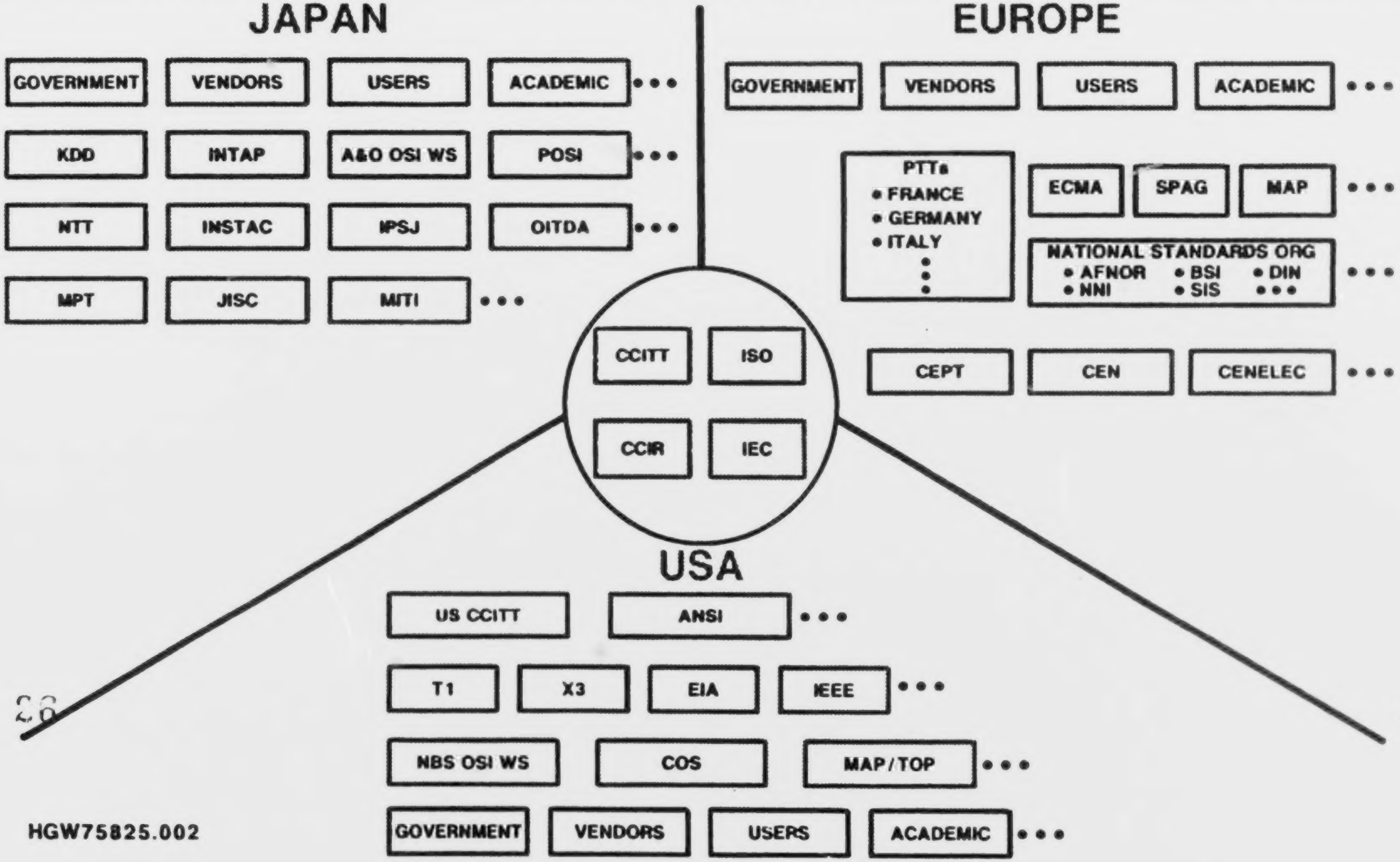
SCOPE

COMPANY
NATIONAL
REGIONAL
INTERNATIONAL

SCOPE

DEPTH

POLITICAL PERSPECTIVE



JAPAN

GOVERNMENT | VENDORS | USERS | ACADEMIC • • •

KDD | INTAP | A&O OSI WS | POSI • • •

NTT | INSTAC | IPSJ | OITDA • • •

MPT | JISC | MITI • • •

EUROPE

GOVERNMENT | VENDORS | USERS | ACADEMIC • • •

PTTs
- FRANCE
- GERMANY
- ITALY

⋮

ECMA | SPAG | MAP • • •

NATIONAL STANDARDS ORG
- AFNOR
- BSI
- DIN
- NNI
- SIS
- • • •

• • •

CEPT | CEN | CENELEC • • •

CCITT | ISO

CCIR | IEC

USA

US CCITT | ANSI • • •

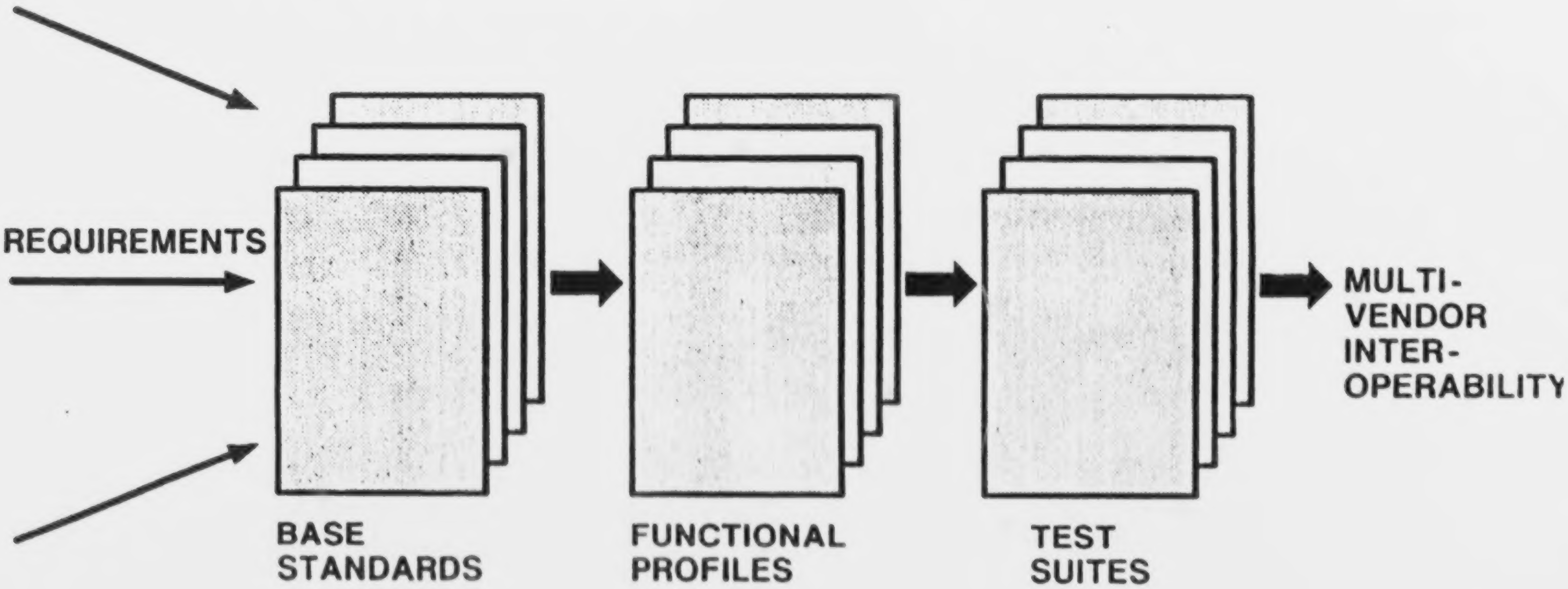
T1 | X3 | EIA | IEEE • • •

NBS OSI WS | COS | MAP/TOP • • •

GOVERNMENT | VENDORS | USERS | ACADEMIC • • •

HGW75825.002

ACHIEVING INTEROPERABILITY



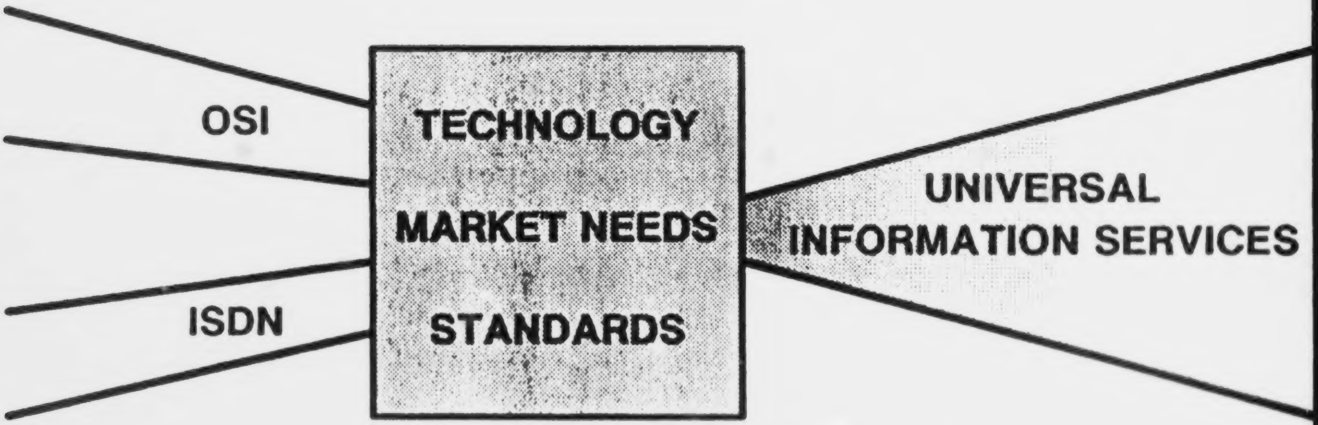
REQUIREMENTS

BASE STANDARDS

FUNCTIONAL PROFILES

TEST SUITES

MULTI-VENDOR INTEROPERABILITY



OSI

ISDN

TECHNOLOGY

MARKET NEEDS

STANDARDS

UNIVERSAL
INFORMATION SERVICES

Session 1 - Interconnecting Large Systems

A - Current System Issues

Open Systems Interconnection

Joseph S. DeBlasi
IBM Corporation

GSA/NBS SYMPOSIUM

SYSTEMS COMMUNICATING WITH SYSTEMS

It is a pleasure to be with you this morning and I thank you for inviting me to discuss some of our thoughts regarding the implementation of OSI.

o IN IBM WE SUPPORT AND PARTICIPATE IN THE DEVELOPMENT OF STANDARDS THAT MEET THE FOLLOWING CRITERIA AND BASED ON THIS CRITERIA WE HAVE SUPPORTED AND PARTICIPATED IN THE DEVELOPMENT OF OSI

- *Standards address real user requirements*
- *Standards do not restrict innovation (concepts, applications, technologies)*
- *Standards are functionally sufficient and economically sound*
- *Standards are recognized worldwide (International Standards)*

In discussing OSI it is important to understand its definition, its objectives, and also what it is not meant to be.

o WHAT IS OSI

- *OSI is a set of international standards for systems interconnection, transport, and communications services.*
- *OSI provides a common basis for the coordination of standards development for the purpose of systems interconnection.*

o WHAT IS THE OBJECTIVE OF OSI

- *The objective of OSI is to define a set of open (public) standards to enable real systems to cooperate.*

OSI provides the framework for the interconnection of systems and the exchange of information between those systems and consists of a reference model, service specifications and protocol specifications.

- WHAT OSI IS NOT
    - *Not the internal functioning of each individual system.*
    - *Implementation of the standards is left to the discretion of the individual system entity.*
    - *All other aspects of systems which are not related to interconnection are outside the scope of OSI.*

IBM has demonstrated its support for OSI for the following reasons, and we have established and been involved in a number of activities worldwide to further the development and implementation of OSI.

- IBM SUPPORTS OSI
    - *IBM supports OSI because we believe it is addressing a true user requirement for systems interconnection between systems of different architecture.*
    - *It does not restrict innovation in that it does not limit the further development of the individual architectures and systems approaches.*
    - *With the advent of a transaction processing capability which is now under development, OSI will be functionally sufficient for its primary purpose of systems-to-systems interconnection.*
    - *It certainly is recognized worldwide and is based on international standards.*

o IBM OSI ACTIVITIES

- *Established the European Networking Center in Heidelberg, Germany, to research the higher layers of OSI and to exchange information among users, researchers and computer manufacturers.*

- *Established an OSI verification service in La Gaude, France, to provide a convenient and effective means of verifying that systems supporting OSI protocols operate properly with IBM systems offering equivalent functions.*

- *Established the Zurich Research Center whose primary mission is to perform communications research which includes LANS and OSI.*

- *Created new telecommunications development centers in Rome, Italy, and Palo Alto, California, to develop worldwide strategic OSI products.*

- *Joined OSINET sponsored by the National Bureau of Standards (NBS). The goal of OSINET is to provide a common set of OSI protocols by which all participants can communicate with each other to do development and research.*

- *Joined EUROSINET which was formed by a group of European suppliers of telecommunications products and services. Its mission is similar in scope to OSINET.*

- *Joined the Corporation for Open Systems whose goals are to accelerate OSI standards development, select a subset of standards to be implemented and provide a conformance testing capability that is recognized on a worldwide basis.*

- *Joined SPAG (Standards Promotion and Application Group).*

However, the implementation of OSI is not as simple as the general concepts and is the reason for a number of activities which have developed worldwide.

- IMPLEMENTATION OF OSI

  In particular, I would like to discuss the following:

  - *The development and orientation of such areas as:*

    Base standards
    Functional profiles
    Systems profiles
    Application implementation

    Testing/conformance
    Certification/marks

  - *Of course, it would be difficult to discuss these areas without also discussing the primary organizations involved in these activities. These, of course, include:*

    ISO/IEC, JTC1
    COS, SPAG, POSI
    MAP/TOP
    NBS WORKSHOP, EWOS, ITAP

- STANDARDS AREA

  - *Organization of JTC1*

  - *SC21-OSI activities*

  - *SSI/ODP (Systems Software Interface/Open Distributed Processing)*

  - *Handling of corrections and changes*

We must take an integrated view of standards, functional profiles, systems profiles and application implementation

- **SPECIAL WORKING GROUP-FUNCTIONAL STANDARDS (ISPs International Standardized Profiles)**
  - *The purpose of the Special Working Group*
  - *Development of functional profiles*
    - *International workshops - NBS, EWOS, ITAP (COS, SPAG)*
    - *GOSIP documents (procurement)*
  - *U.S. participation/European leadership*
  - *Role of COS, MAP/TOP - National or International*

It is also very important at this time to discuss the question of conformance which is a necessary part of the process, however, we do not believe there is a need for certification and marks which will only increase costs and provides no real additional assurance to the user.

- **VIEWS ON THE NEED FOR AGREED TO TESTS**
  - *For assurance to meet the standards*
  - *Development of criteria - standards*
  - *Cooperative effort for development of tests and test tools*
  - *Must be integrated in the development and manufacturing process*
  - *Cannot assure interoperability*

- **VIEWS ON CERTIFICATION AND MARKS**
  - *Not necessary and not practical*
  - *Increased costs*

In summary, I would like to stress the following major points:

- SUMMARY
  - *Established need for OSI*
  - *Established need for agreed to test and test tools to test conformity to the standards*
  - *No established need for certification and marks*
  - *Profiles are important and can add to the proper implementation of OSI*
  - *Organizations must get their act together*
  - *U.S. must maintain a leadership role*

Again, I would like to thank you for your invitation. It was a pleasure and privilege to participate in this symposium.

Government Open Systems Interconnection Profile (GOSIP)

Kevin Mills

National Bureau of Standards

SCOPE

TO ALLOW COMMUNICATION AND INTEROPERATION AMONG END SYSTEMS AND INTERMEDIATE SYSTEMS ON DIFFERENT SUBNETWORKS.

PURPOSE

TO CO-ORDINATE THE ACQUISITION AND OPERATION OF OSI PRODUCTS BY THE FEDERAL GOVERNMENT

APPLICABILITY

- TO BE USED BY ALL FEDERAL GOVERNMENT AGENCIES WHEN ACQUIRING PRODUCTS AND SERVICES WHICH PROVIDE THE GENERAL FUNCTIONAL EQUIVALENCE OF THE PROTOCOLS CONTAINED IN GOSIP
- FOR TWO YEARS AGENCIES ARE PERMITTED TO PURCHASE ALTERNATIVE PROTOCOLS
- WAIVERS SHOULD BE REQUESTED FOR SPECIAL PURPOSE NETWORKS OR PRODUCTS SUPPORTING NETWORK RESEARCH

INITIAL NETWORK TECHNOLOGIES REFERENCED BY GOSIP

- X.25
- 802.3
- 802.4
- 802.5

INITIAL APPLICATIONS REFERENCED BY GOSIP

- FILE TRANSFER, ACCESS, AND MANAGEMENT
- MESSAGE HANDLING SYSTEMS (X.400)

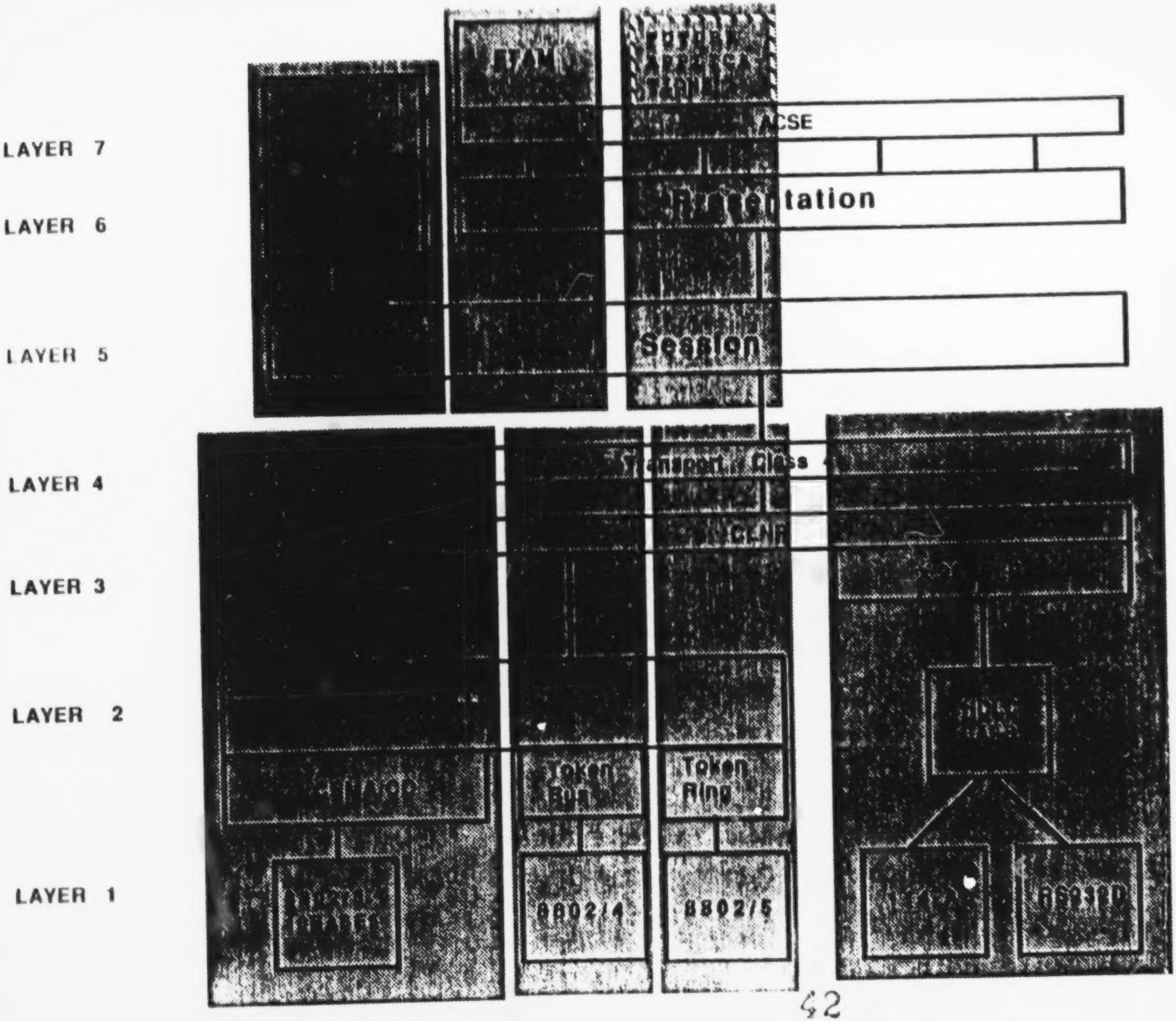

LAYER 7
LAYER 6
LAYER 5
LAYER 4
LAYER 3
LAYER 2
LAYER 1
FTAM
ACSE
Presentation
Session
Transport - Class 4
Token Bus
Token Ring
8802/4
8802/5

FIGURE 3.1 GOVERNMENT OSI ARCHITECTURE

- GOSIP IS BASED ON AGREEMENTS REACHED AT THE NBS/OSI IMPLEMENTORS WORKSHOP
- GOSIP IS FUNCTIONALLY COMPATIBLE WITH THE MAP AND TOP SPECIFICATIONS
- GOSIP REFERENCES PROTOCOLS THAT ARE OR SOON WILL BE ON THE MARKETPLACE

TESTING OF GOSIP PROTOCOLS

- CONFORMANCE TESTING
- INTEROPERABILITY TESTING
- PERFORMANCE TESTING

- GOSIP CREATED AND REVISED BY GOSIP INITIAL SPECIFICATION GROUP
- COMMENTS RECEIVED FROM 24 GOVERNMENT AGENCIES, 18 VENDORS/ USERS

CHANGE PROCEDURES

- REVISIONS
- ADDENDA
- ERRATA

ORGANIZATIONS CONTRIBUTING TO THE DEVELOPMENT OF GOSIP

DEPARTMENT OF AGRICULTURE
DEPARTMENT OF COMMERCE
DEPARTMENT OF DEFENSE
DEPARTMENT OF EDUCATION
DEPARTMENT OF HEALTH AND HUMAN SERVICES
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
DEPARTMENT OF THE INTERIOR
DEPARTMENT OF JUSTICE
DEPARTMENT OF LABOR
DEPARTMENT OF TRANSPORTATION
DEPARTMENT OF THE TREASURY
ENVIRONMENTAL PROTECTION AGENCY
GENERAL SERVICES ADMINISTRATION
LIBRARY OF CONGRESS
NASA
NATIONAL COMMUNICATIONS SYSTEM
NATIONAL SCIENCE FOUNDATION
OFFICE OF MANAGEMENT AND BUDGET

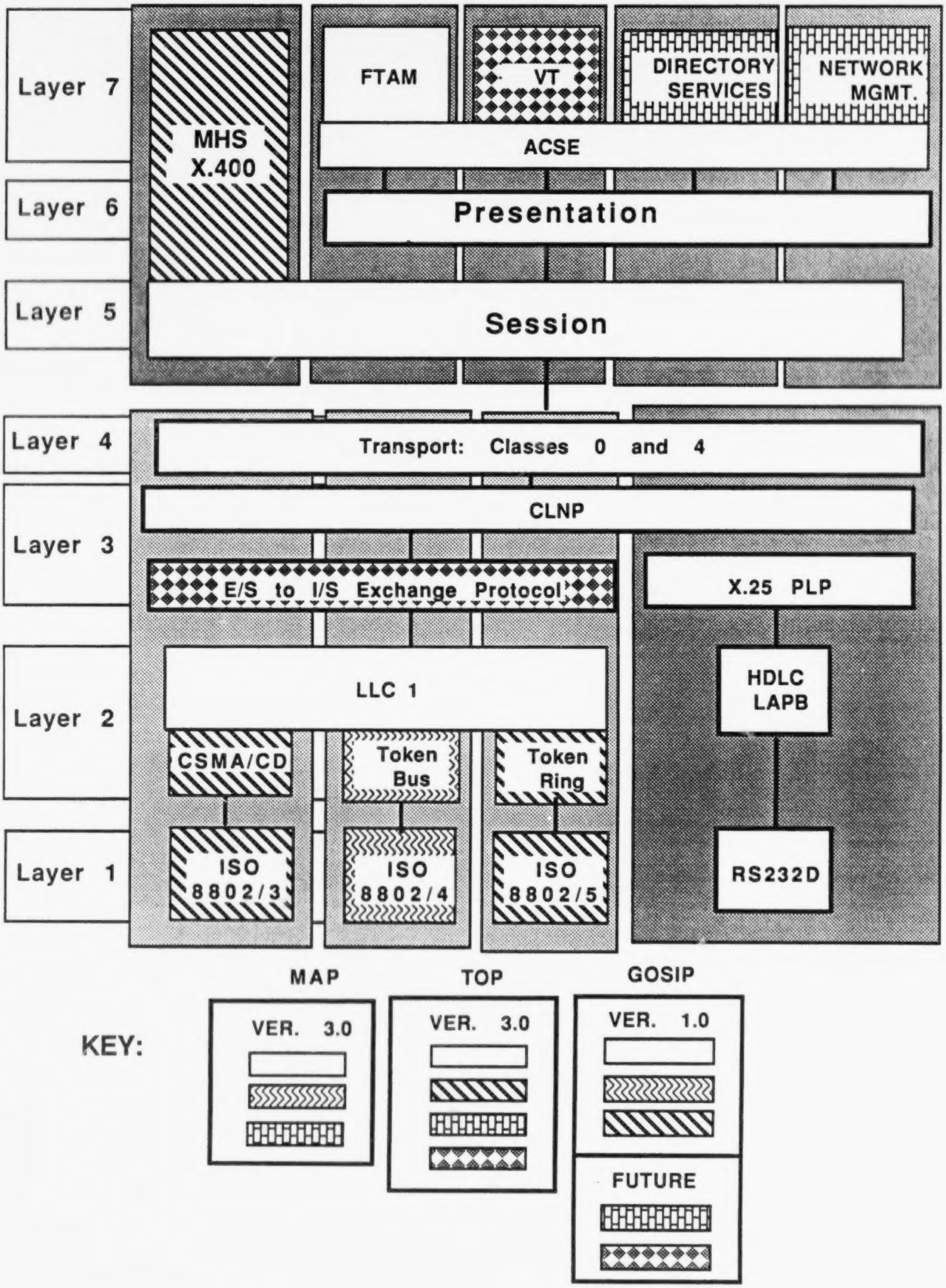
GOVERNMENT AGENCIES RESPONDING TO GOSIP DOCUMENT

DEPARTMENT OF AGRICULTURE
DEPARTMENT OF EDUCATION
DEPARTMENT OF ENERGY
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
DEPARTMENT OF JUSTICE
DEPARTMENT OF LABOR
DEPARTMENT OF NAVY
DEPARTMENT OF TRANSPORTATION
DEPARTMENT OF TREASURY
ENVIRONMENTAL PROTECTION AGENCY
EQUAL OPPORTUNITY COMMISSION
FEDERAL COMMUNICATIONS COMMISSION
FEDERAL ENERGY MANAGEMENT AGENCY
FEDERAL ENERGY REGULATORY COMMISSION
FEDERAL HOME LOAN BANK BOARD
FEDERAL RESERVE
LIBRARY OF CONGRESS
NASA
NATIONAL MEDIATION BOARD
PEACE CORPS
RAILROAD RETIREMENT BOARD
TVA
U.S. AIR FORCE
U.S. GOVERNMENT PRINTING OFFICE

VENDORS/USERS RESPONDING TO GOSIP DOCUMENT

AT&T
BELL COMMUNICATIONS RESEARCH
BOEING COMPUTER SERVICES (TOP)
CODEX
COMPUTER SCIENCE CORPORATION
DATA GENERAL
DIGITAL
EXCELAN
HEWLETT PACKARD
HONEYWELL
IBM
ICL
NORTHROP
SPAG
TOUCH COMMUNICATIONS
UNISYS
WANG CORPORATION
XEROX CORPORATION

APPLICATION PROFILES OF OSI PROTOCOLS


Layer 7
Layer 6
Layer 5
Layer 4
Layer 3
Layer 2
Layer 1
MHS X.400
FTAM
VT
DIRECTORY SERVICES
NETWORK MGMT.
ACSE
Presentation
Session
Transport: Classes 0 and 4
CLNP
E/S to I/S Exchange Protocol
X.25 PLP
LLC 1
HDLC LAPB
CSMA/CD
Token Bus
Token Ring
ISO 8802/3
ISO 8802/4
ISO 8802/5
RS232D
KEY:
MAP
VER. 3.0
TOP
VER. 3.0
GOSIP
VER. 1.0
FUTURE

WHAT'S NEXT?

- GOSIP WILL BE PUBLISHED AS A FEDERAL INFORMATION PROCESSING STANDARD
- GOSIP ADVANCED REQUIREMENTS GROUP
- GOSIP USER'S GUIDE

GOSIP PROTOCOLS & POSIX

- IMPLEMENT GOSIP PROTOCOLS IN OPENLY AVAILABLE FORM
- POSIX-CONFORMANT BERKELEY UNIX
- PROTOCOLS IN BSD KERNEL
  - TRANSPORT CLASS 4
  - CLNP
  - ES-IS
  - 802.3 AND X.25
- PROTOCOLS IN ISODE
  - SESSION, PRESENTATION, ROS, ACSE
  - FTAM, X.400, VTP
  - DIRECTORY SERVICES
  - FTAM/FTP AND X.400/SMTP GATEWAYS

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301-3040

COMMAND, CONTROL,
COMMUNICATIONS
AND
INTELLIGENCE

2 JUL 1987

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN, JOINT CHIEFS OF STAFF
DIRECTORS, DEFENSE AGENCIES

SUBJECT: Open Systems Interconnection Protocols

There has been recent rapid progress in the specification and implementation of computer protocols based on the International Organization for Standardization model for Open Systems Interconnection (OSI). The Government OSI Profile (GOSIP), dated 22 April 1987, contains sufficient information to specify adequately and acquire interoperable vendor implementations of OSI message handling and file transfer capabilities. Therefore, the policy on standardization of host-to-host protocols for data communications, promulgated by USDR&E memo of 23 March 1982, is modified as follows. The OSI message handling and file transfer protocols, together with their underlying protocols as defined in GOSIP, are adopted as experimental co-standards to the DoD protocols which provide similar services (MIL-STDs 1777, 1778, 1780, and 1781). These OSI protocols may be specified in addition to, in lieu of, or as an optional alternative to DoD protocols, in cases where the current DoD protocol applicability statements apply. They are designated as experimental because of the limited operational experience currently available with the OSI protocols and the limited operational, testing, and security environment currently defined in GOSIP. Services and agencies choosing to implement OSI protocols at this time should carefully evaluate these factors and be prepared to deal with the complications which may accompany the introduction of new technology.

It is intended to adopt the OSI protocols as a full co-standard with the DoD protocols when GOSIP is formally approved as a Federal Information Processing Standard. Two years thereafter, the OSI protocols would become the sole mandatory interoperable protocol suite; however, a capability for inter-operation with DoD protocols would be provided for the expected life of systems supporting the DoD protocols.

In order to extend the OSI protocol capabilities and provide interoperability between the DoD and OSI protocols as rapidly as possible, the following actions are requested:

a. The Director, Defense Communications Agency, as the DoD Executive Agent for Data Communications Protocol Standards, should:

- o Publish by November 1987 the DoD-OSI Interoperability and Transition Plan. The plan should provide for interoperation of the DoD and OSI protocols at the application level. A capability for experimental interoperability of DoD and OSI message handling and file transfer capabilities should be provided by March 1988, and a limited operational capability by January 1989.

- o Join the Corporation for Open Systems (COS) as the Department of Defense representative. COS is a non-profit consortium formed to deal with testing and other operational issues relating to OSI protocols. At the request of the Office of Management and Budget, the Services and other defense agencies should not join COS directly, but may participate as the agents of DCA on appropriate COS committees.

- o Coordinate Service and agency participation, in accordance with existing directives, in groups developing OSI standards, specifications, and oper-ating and management procedures. These groups include the Government OSI User's Group, the National Bureau of Standards OSI Implementor's Workshops, the Corporation for Open Systems, the Manufacturing and Automation Protocol (MAP) and Technical and Office Protocol (TOP) user's groups, the American National Standards Institute X3S3 and X3T5 committees, and the NATO Tri-Service Group on Communications and Electronic Equipment, Sub-Group 9 (Data Processing and Distribution).

b. The Director, National Security Agency should assure that the efforts of the ongoing Secure Data Network Systems program can be used to provide the security extensions defined as future work items in GOSIP.

c. The Services and defense agencies should share the results and experience of early implementations under the experimental coexistence policy by actively participating in the groups indicated above, under DCA coordination. This experience should be particularly valuable in assuring that military requirements can be satisfied by the developing OSI standards, specifications, and procedures.

This guidance provides for the interim steps necessary to continue progress toward implementation of OSI standards. As the technology matures and DoD gains additional experience, the final implementation details will be provided in a DoD Directive.

Donald C. Latham

Donald C. Latham

Integrated Systems Digital Network (ISDN)

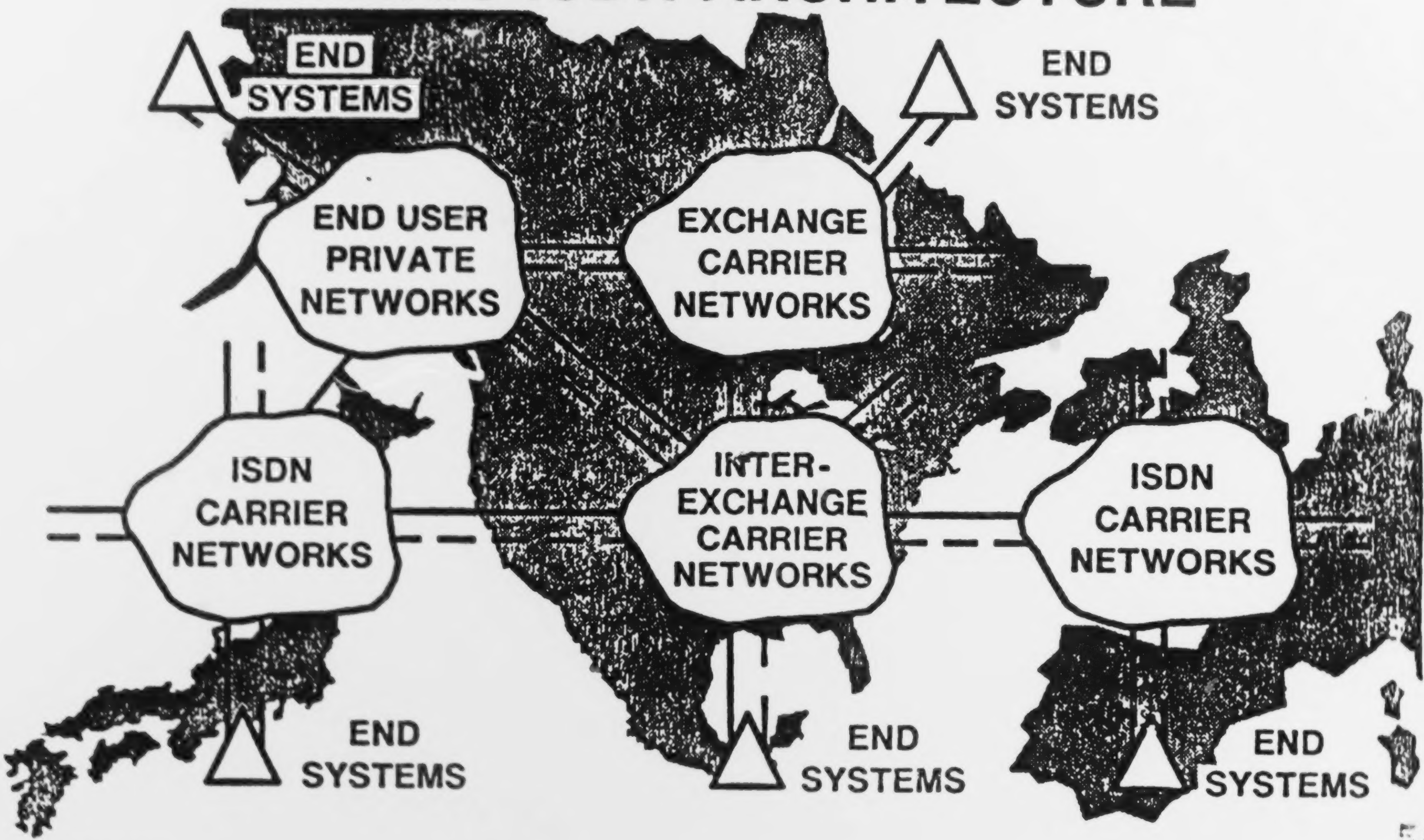
John Robertson

AT&T District

INTEGRATED SERVICES DIGITAL NETWORK

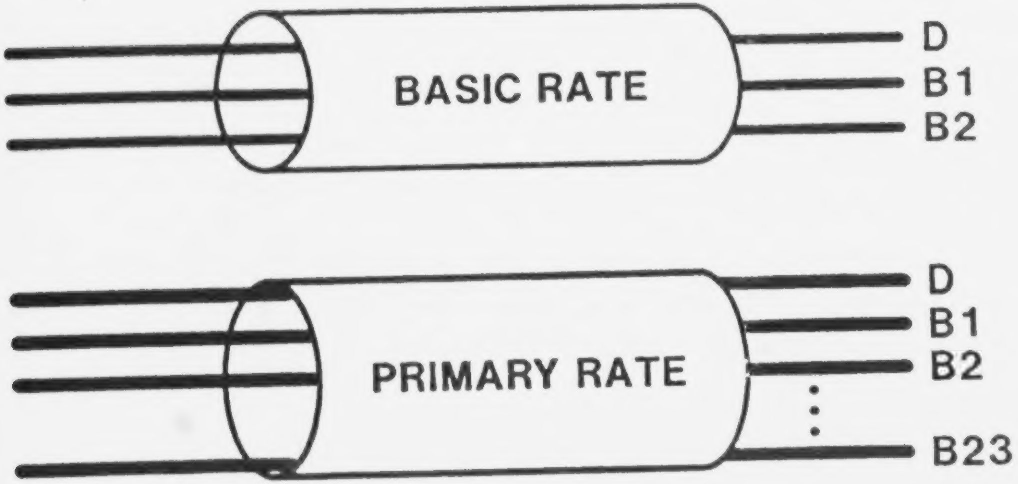
- AN INTERNATIONAL NETWORK AND SERVICE STANDARD
- DIGITALIZATION OF ACCESS
- MULTIPLEXING OF VOICE / DATA ON LOOPS AND TRUNKS
- MESSAGE-BASED SIGNALLING AND CONTROL
- BROADBAND INTERFACE (LONG TERM) FOR INTEGRATED VOICE / DATA / IMAGE / VIDEO

GENERIC ISDN ARCHITECTURE


END
SYSTEMS
END USER
PRIVATE
NETWORKS
EXCHANGE
CARRIER
NETWORKS
END
SYSTEMS
ISDN
CARRIER
NETWORKS
INTER-
EXCHANGE
CARRIER
NETWORKS
ISDN
CARRIER
NETWORKS
END
SYSTEMS
END
SYSTEMS
END
SYSTEMS

HGB73629.062

ISDN

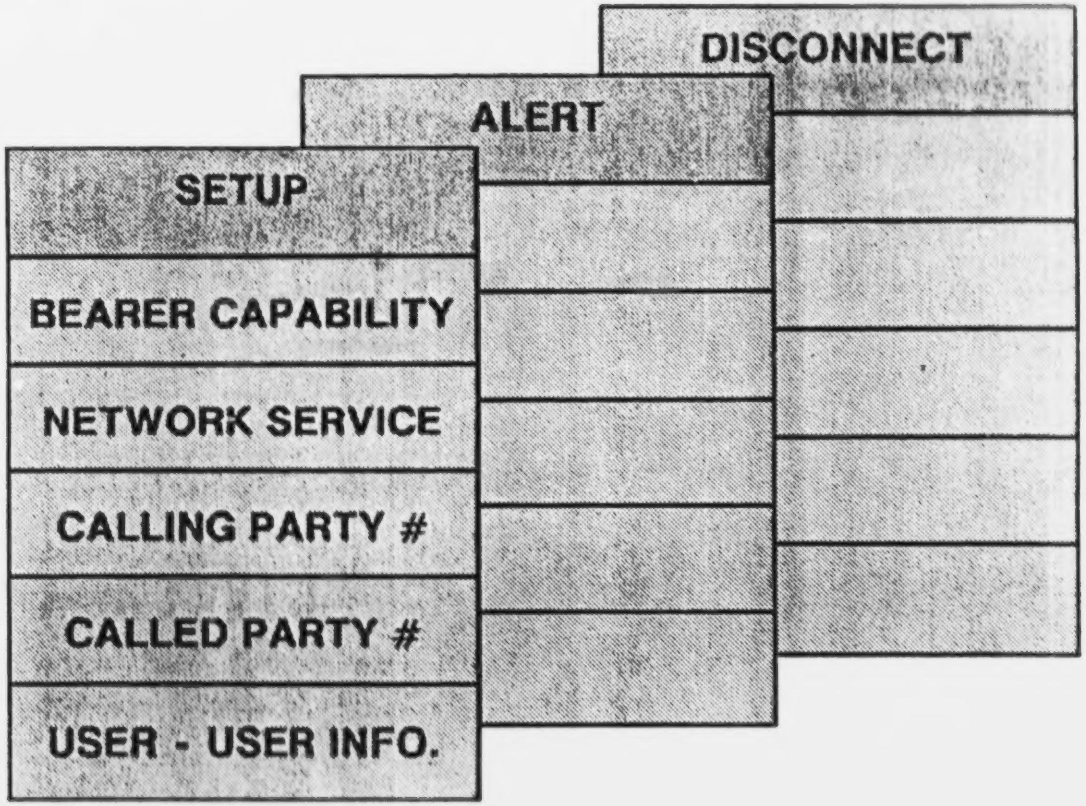

BASIC RATE
D
B1
B2
PRIMARY RATE
D
B1
B2
B23

D CHANNEL	SIGNALING + PACKET DATA
B CHANNEL	CLEAR 64 Kbps DIGITAL ACCESS

ISDN MESSAGE ORIENTED SIGNALING
(Q.931 PROTOCOL)

FUNCTIONAL
MESSAGES

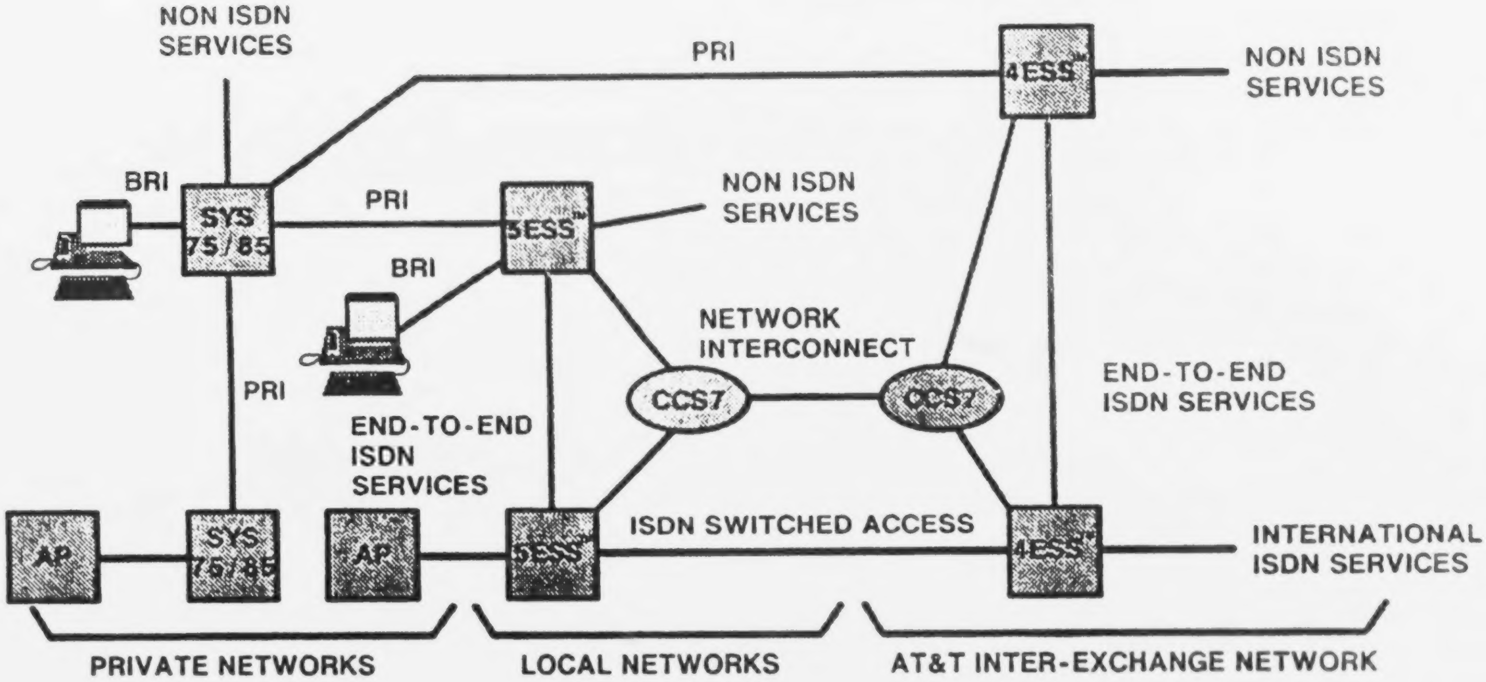
COMPOSED OF
INFORMATION
ELEMENTS


DISCONNECT
ALERT
SETUP
BEARER CAPABILITY
NETWORK SERVICE
CALLING PARTY #
CALLED PARTY #
USER - USER INFO.

●●● ETC.

AT&T ISDN SUMMARY

Inter-Network Connectivity*


NON ISDN SERVICES
PRI
4ESS™
NON ISDN SERVICES
BRI
SYS 75/85
PRI
5ESS™
NON ISDN SERVICES
BRI
NETWORK INTERCONNECT
PRI
CCS7
CCS7
END-TO-END ISDN SERVICES
END-TO-END ISDN SERVICES
AP
SYS 75/85
AP
5ESS™
ISDN SWITCHED ACCESS
4ESS™
INTERNATIONAL ISDN SERVICES
PRIVATE NETWORKS
LOCAL NETWORKS
AT&T INTER-EXCHANGE NETWORK

*ANALOG AND PRE-ISDN CONNECTIVITY NOT SHOWN

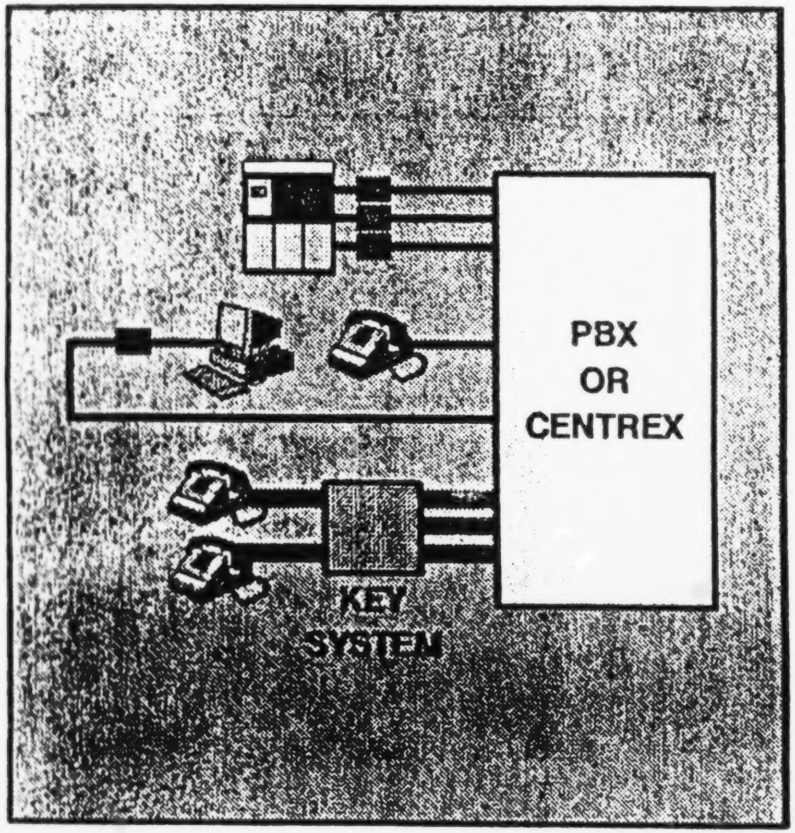
HGF75019.007

ISDN APPLICATIONS / SERVICES

- ISDN BUSINESS CAPABILITIES
- TELEMARKETING
- DATA NETWORKING
- NETWORK MANAGEMENT

INTEGRATED VOICE / DATA CONNECTIVITY

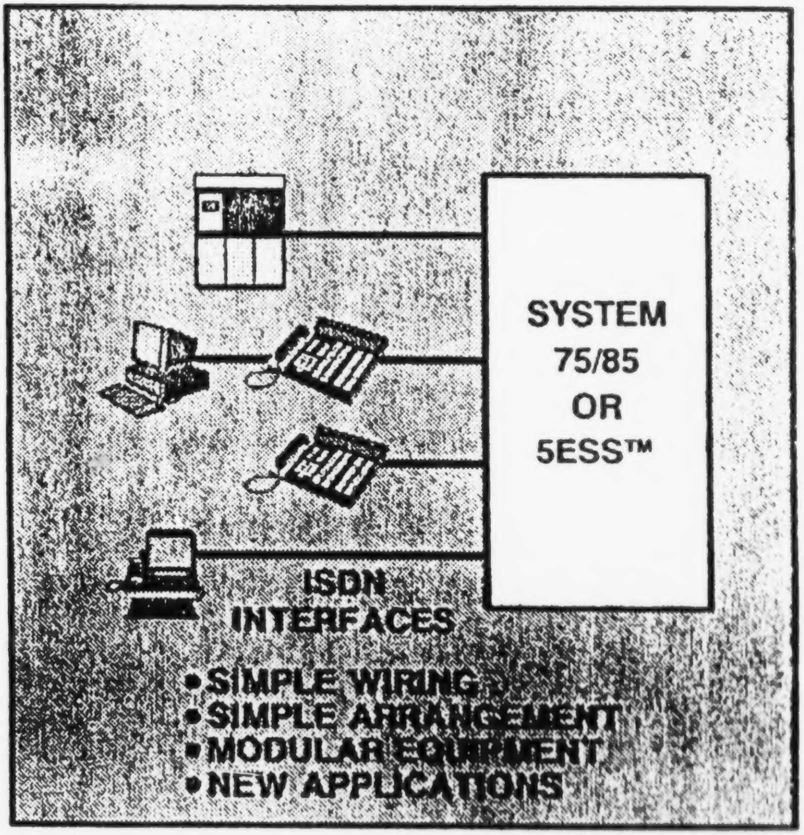
BEFORE ISDN



PBX
OR
CENTREX

KEY
SYSTEM

WITH ISDN



SYSTEM
75/85
OR
5ESS™

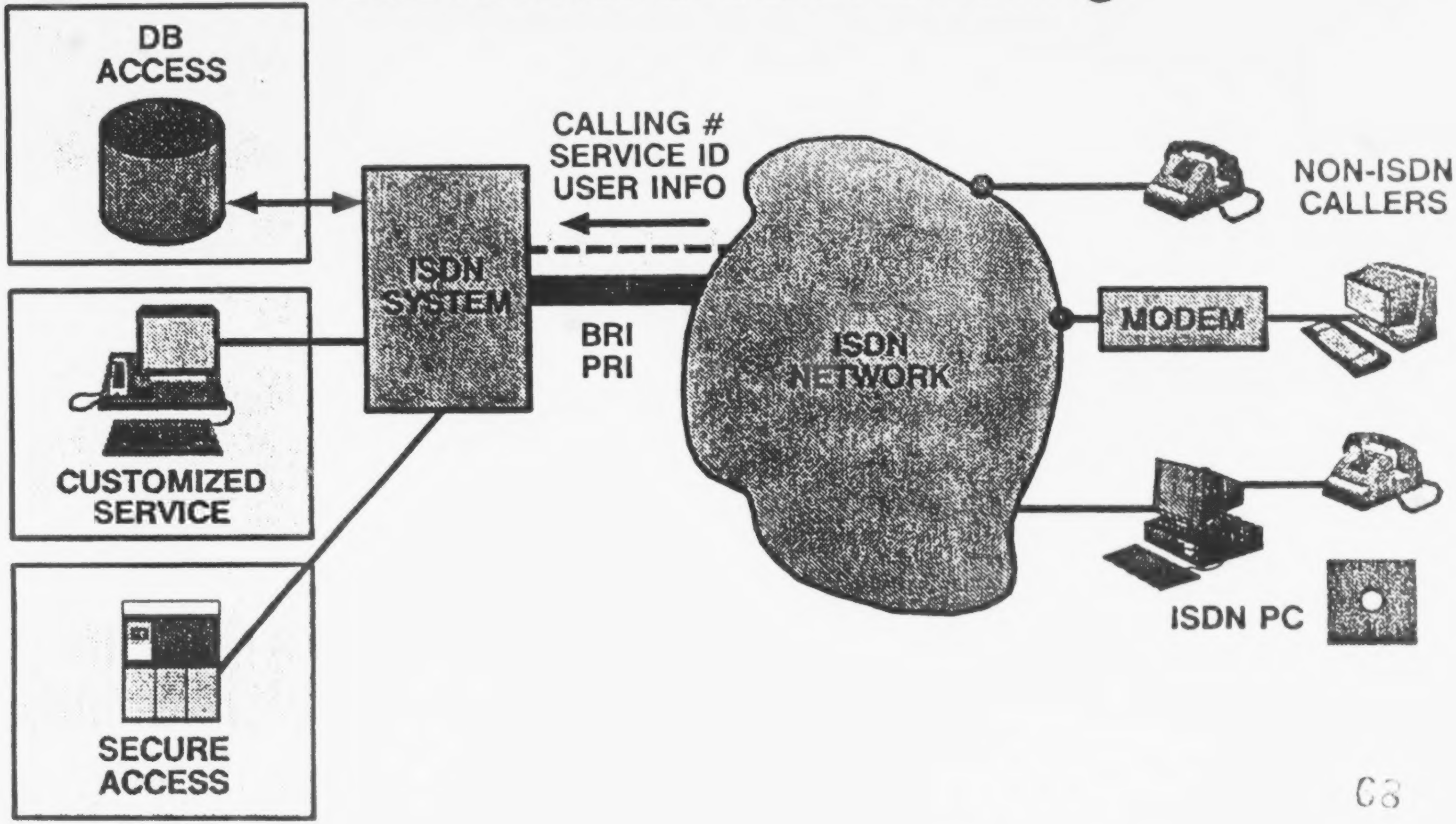
ISDN
INTERFACES

- SIMPLE WIRING
- SIMPLE ARRANGEMENT
- MODULAR EQUIPMENT
- NEW APPLICATIONS

HGJ75982.003

INTEGRATED VOICE / DATA APPLICATIONS

Customized Call Handling



DB ACCESS

CUSTOMIZED SERVICE

SECURE ACCESS

ISDN SYSTEM

CALLING #
SERVICE ID
USER INFO

BRI
PRI

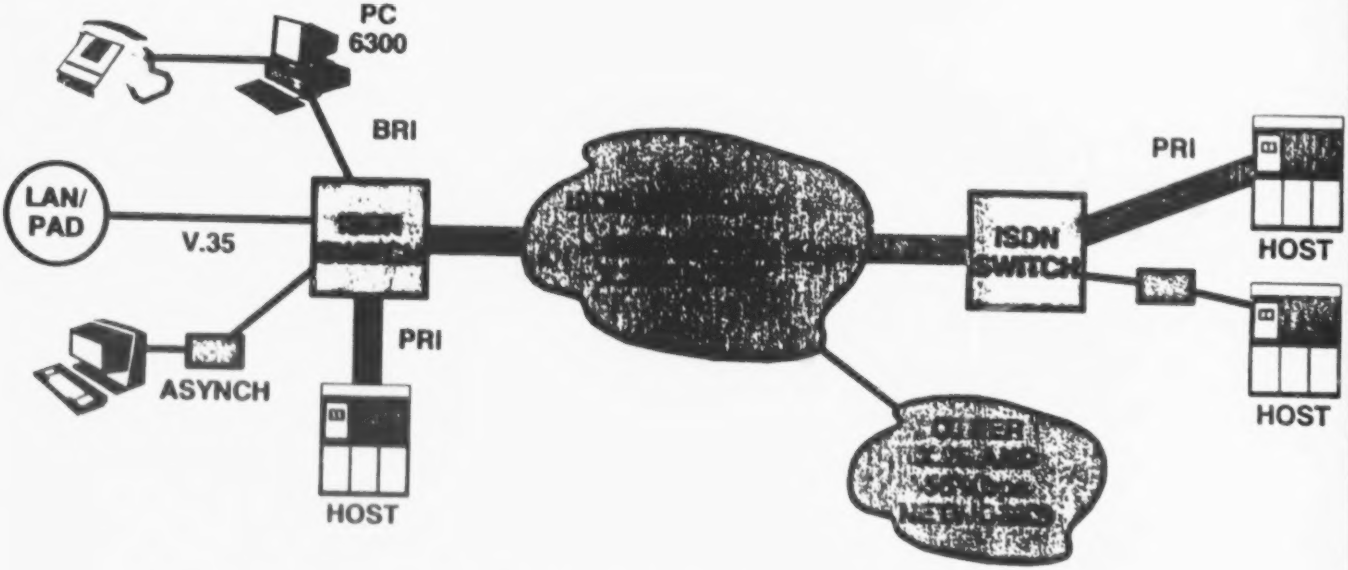
ISDN NETWORK

NON-ISDN CALLERS

MODEM

ISDN PC

ISDN DATA TRANSPORT
Switched 64Kbps & X.25 Packet Networking


PC
6300
BRI
LAN/
PAD
V.35
ASYNCH
PRI
HOST
ISDN
SWITCH
PRI
HOST
HOST
OTHER

- LOCAL AND WIDE AREA NETWORKING
- CRISIS RECOVERY
- HOST TO HOST FILE TRANSFER

HGG75206.004

ISDN NETWORK MANAGEMENT

Initial Capabilities

• PERFORMANCE MANAGEMENT	- USER CONTROLLED SERVICE ACCESS PRIORITIES - D-CHANNEL DIAGNOSTICS
• FAULT MANAGEMENT	- OUT OF SERVICE STATUS & CONTROL - TEST CALLS
• SECURITY MANAGEMENT	- CALLING NUMBER IDENTITY - OUT OF BAND USER-USER INFORMATION
• NETWORK PLANNING	- INCOMING CALL DEMOGRAPHICS - PEAK SERVICE DEMANDS
• ACCOUNTING MANAGEMENT	- ANSWER SUPERVISION FOR BILLBACK

HGG75206.001

Session 1 - Interconnecting Large Systems

B - Emerging Network Issues

Local Area Networks

Gary Robinson

Digital Equipment Corporation

THE FUTURE OF LOCAL AREA NETWORKS (LANs)

Gary S. Robinson
Digital Equipment Corporation

GSA/NBS SYMPOSIUM

3 December 1987
Gaithersberg, MD

-BACKGROUND-

- IEEE 802 family of LANs were the first significant interconnect/interface schemes developed in a standards committee.
- Work on the standards pre-dated the market acceptance of LANs.
  - LANs were not in general production
  - Market for LANs was not established.
- The standards process helped to develop the market for the ideas and products as the standard was developed

-BACKGROUND-

- When IEEE 802 began work, over 35 LAN schemes existed.
- There are now less than 5 major designs - which have different user/provider models and functions.
- The users and the providers both benefit:
  - Greater demand for similar products;
  - Greater supply of similar products;
  - Interoperability of LAN designs;
  - Higher volume of LANs and LAN components has driven price of LANs down.

Gary S. Robinson
Digital Equipment Corporation

GSA/NBS SYMPOSIUM

3 December 1987
Gaithersberg, MD

-IMPLICATIONS OF DESIGN-

INTEROPERABILITY

- CSMA/CD, Token Ring, Token Bus - are now interoperable.
- Design goal in standards committees was to achieve and maintain this interoperability
- Allows LAN to LAN communication

TRENDS

- Expansion of the LAN base
  - Lower cost, simpler to install/operate
  - Flexible designs
  - Backward compatible
  - Interoperable
  - Simplicity of use stressed
  - User installable and operable

FUTURE

UP AND DOWN 802

- Low end LANs - Twisted pair (less expensive and easier to install)
- Broad Band - (larger variety of uses and users)
- Fiber Optic - (distance increase and EMI solution)

DESIGN GOALS

- Interoperability and backwards compatibility

BRIDGE NETWORKS

- Heterogeneous LAN networks
- Tied together
  - LANs
  - Wide Area Networks (WANs)
  - Metropolitan Area Networks (MANs)

STANDARDS AND LANs

- LANs designed in open committee
- Emphasize compatibility and interoperability
- Standards effort leads market development- and the commercialization of the product
- No single provider or user dominated the process
  - Proprietary solutions are no longer acceptable
  - System interconnects are designed by standards committees
- Ultimately serve a business purpose - allows better use of both computer and human resources
- The user has benefited from the process - which is the goal of standardization

Computer Aided Logistics Support (CALS)

Bruce Lepisto

Office of the Secretary of Defense

DoD Initiatives in Computer-Aided Acquisition and Logistic Support

CALS

BRUCE LEPISTO
OFFICE OF THE SECRETARY OF DEFENSE

WHAT IS CALS?

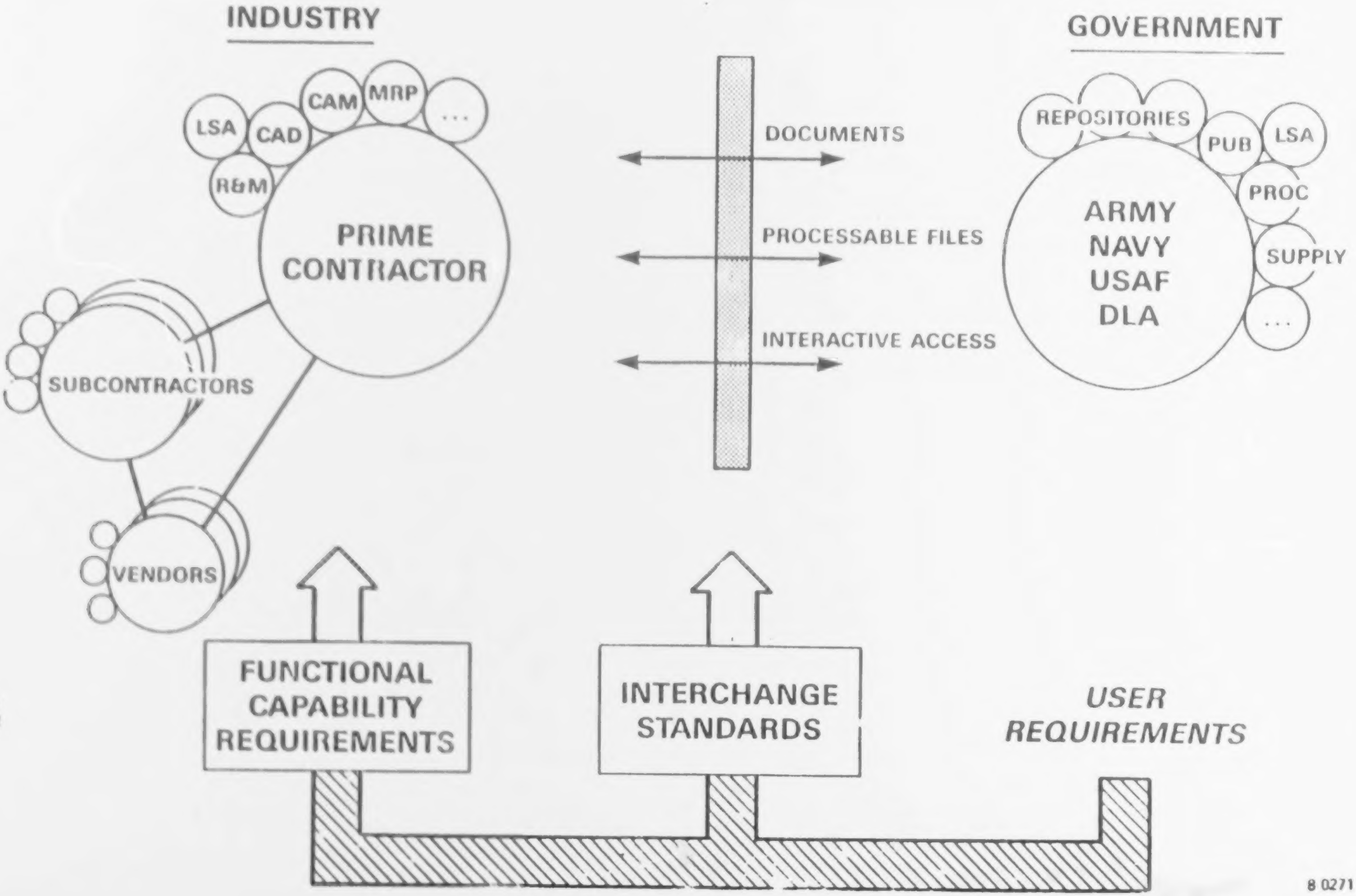
- INTEGRATION PROGRAM
- BRIDGE "ISLANDS OF AUTOMATION" IN DoD AND INDUSTRY DESIGN AND LOGISTICS PROCESSES
- GAIN BENEFITS OF A HIGHLY AUTOMATED AND INTEGRATED SYSTEM
  - REDUCE PAPER
  - IMPROVE TIMELINESS AND ACCURACY OF INFORMATION
  - DESIGN MORE SUPPORTABLE WEAPON SYSTEMS
  - REDUCE COSTS

CALS POLICY INITIATIVE (DEPSECDEF MEMORANDUM)

OBJECTIVES

- ACCELERATE INTEGRATION OF R&M DESIGN TOOLS INTO CONTRACTOR CAD/CAE SYSTEMS
- AUTOMATE CONTRACTOR PROCESSES FOR GENERATING LOGISTIC TECHNICAL INFORMATION
- RAPIDLY INCREASE DOD CAPABILITY TO RECEIVE, DISTRIBUTE AND USE TECH INFO IN DIGITAL FORM
  - BY 1990, NEW MAJOR WEAPON SYSTEMS WILL ACQUIRE TECHNICAL INFORMATION IN DIGITAL FORM

DIGITAL INFORMATION EXCHANGE



INDUSTRY

LSA
CAD
CAM
MRP
. . .
R&M
PRIME CONTRACTOR
SUBCONTRACTORS
VENDORS

DOCUMENTS
PROCESSABLE FILES
INTERACTIVE ACCESS

GOVERNMENT

REPOSITORIES
PUB
LSA
PROC
SUPPLY
. . .
ARMY
NAVY
USAF
DLA

FUNCTIONAL CAPABILITY REQUIREMENTS

INTERCHANGE STANDARDS

USER REQUIREMENTS

8 0271

WEAPON SYSTEM CONTRACT

— 1990's

SPECIFIED FUNCTIONAL REQUIREMENTS

- INTEGRATED DESIGN, MANUFACTURING, LOGISTICS DATA BASE
  - — NEAR REAL TIME CONFIGURATION UPDATES
  - — SPECIFIED GOVERNMENT ACCESS
  - — DATA BASE TRANSPORTABILITY
- ONLINE R&M DESIGN TOOLS IN CAD/CAE ENVIRONMENT
- AUTOMATED GENERATION OF LOGISTIC DATA PRODUCTS
  - — NO UNNECESSARY DUPLICATION OF PREPARATION EFFORT
  - — PAPERLESS DELIVERY CAPABILITY

WEAPON SYSTEM CONTRACT
— 1990's

DELIVERABLES

- PRODUCT DEFINITION DATA (ELECTRONIC FORMAT)
  - ENGINEERING DRAWINGS
  - 3-D PRODUCT MODELS
- TECHNICAL MANUALS
  - DIGITAL TO PAPER (AUTOMATED PUBLISHING)
  - DIGITAL TO DIGITAL (EG, INTERACTIVE MAINTENANCE AIDS)
- LOGISTIC SUPPORT ANALYSIS RECORD DATA
- TRAINING MATERIALS
- ILS MANAGEMENT DATA

EVOLVING CALS TECHNOLOGIES

	CURRENT	NEAR TERM	LONGER TERM
• TECH MANUALS	• PAPER	• PRINT ON DEMAND • ELECTRONIC PAGE TURNERS	• INTELLIGENT INTERACTIVE MAINT AIDS
• ENGINEERING DWGS	• APERTURE CARDS	• RASTER SCAN • LIMITED VECTOR TRANSFER	• COMPLETE DIGITAL PRODUCT MODEL
• LOGISTIC SUPPORT ANALYSIS	• 1388 LSAR TAPE	• CONTRACTOR-SPECIFIC ONLINE ACCESS	• NEUTRAL QUERY OF HETEROGENEOUS SYSTEMS

7-0623

CALS CORE REQUIREMENTS
PACKAGES

PHASE I

- FOCUS ON
  - A FEW MAJOR LOGISTICS APPLICATIONS
  - AVAILABLE TECHNOLOGY, STANDARDS
  - PRIMARILY "RECORDS TRANSFER" ENVIRONMENT

PHASE II

- FOCUS ON
  - WIDER RANGE OF DESIGN, MFG, LOGISTICS APPLICATIONS
  - MORE ADVANCED TECHNOLOGY, STANDARDS
  - CENTROID IS ADVANCED PRODUCT DATA MODELS
  - PRIMARILY "ONLINE ACCESS" ENVIRONMENT

FY-87 ACCOMPLISHMENTS

- STRATEGY FOR CALS IMPLEMENTATION FORMULATED
  - INDUSTRY TASK FORCE ACTIVATED
- DRAFT PHASE I.0 CORE REQUIREMENTS RELEASED
  - STANDARDS FOR ENGINEERING DRAWINGS, TECHNICAL MANUALS, LSAR
  - EXCEPTIONAL INDUSTRY INVOLVEMENT AND SUPPORT
- LEAD WEAPON SYSTEMS DESIGNATED
  - SSN-21, V-22, ATA, ATF, LHX
  - JLC SUPPORT AND COMMITMENT
- SERVICE TECHNOLOGY DEMONSTRATIONS FUNDED
  - INITIAL ELEMENTS OF CALS DISTRIBUTED TEST BED
- INCLUSION OF CALS IN DOD INFRASTRUCTURE MODERNIZATION
  - ARMY CALS, NAVY CAD, DSREDS/EDCARS, EDMICS

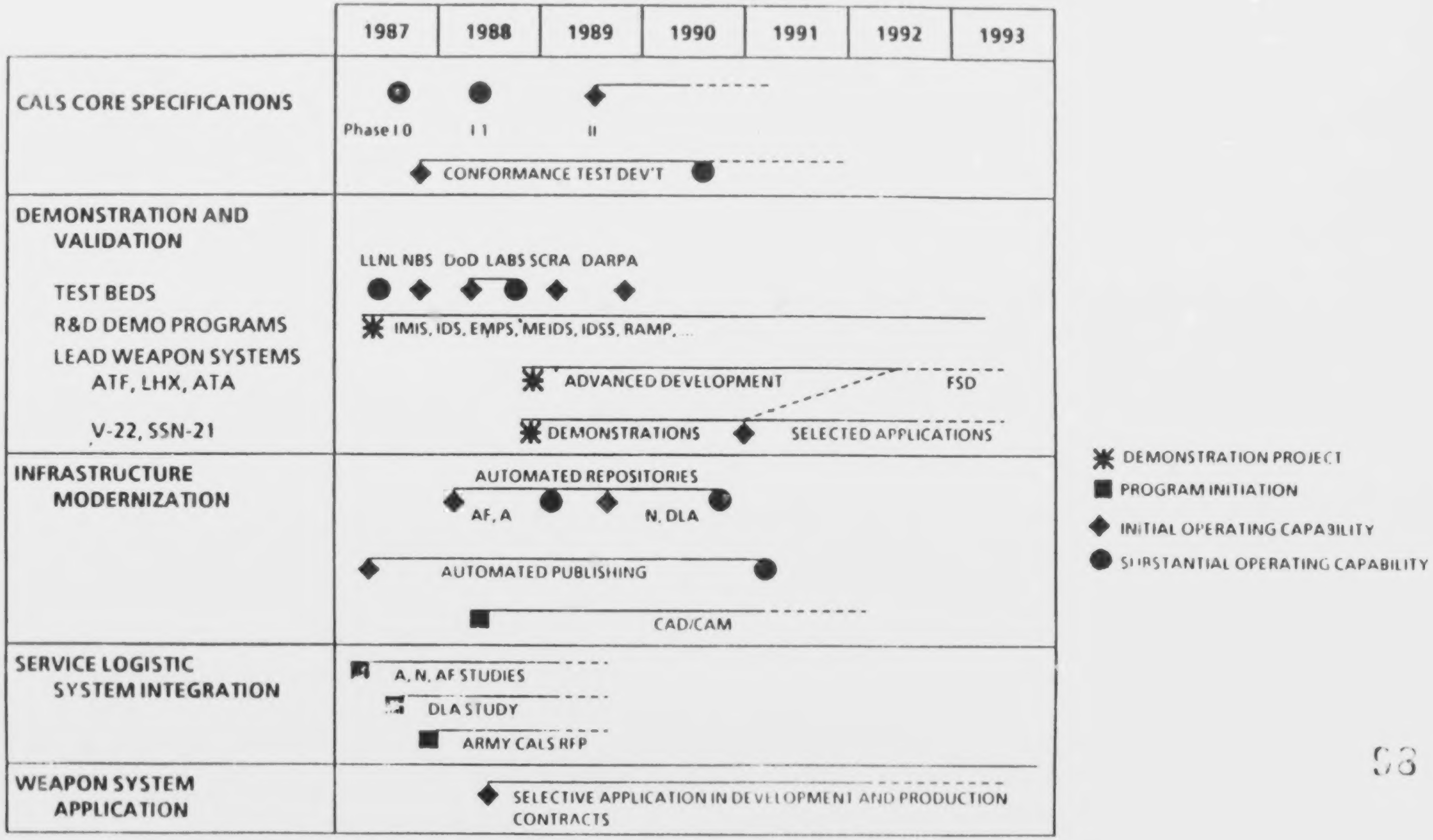
CALS CORE REQUIREMENTS
TECHNICAL STANDARDS

- CALS PHASE I.0
  - MIL-STD-1840A—AUTOMATED INTERCHANGE OF TECHNICAL INFORMATION
  - DOD-D-28000—DIGITAL REPRESENTATION FOR COMMUNICATION OF PRODUCT DATA: APPLICATION SUBSETS
    - DOD-D-IGES
  - DOD-M-28001—MARKUP REQUIREMENTS AND GENERIC STYLE SPECIFICATION FOR ELECTRONIC PRINTED OUTPUT AND EXCHANGE OF TEXT
    - DOD-M-SGML
- CALS PHASE I.1 AND BEYOND
  - RASTER GRAPHICS, CGM, ODA/ODIF, PDL, ETC.

MAJOR THRUSTS FOR FY-88

- TESTING OF PHASE I STANDARDS
- TRIAL CONTRACTUAL IMPLEMENTATIONS
- EXPANSION OF PHASE I CORE
  - FUNCTIONAL REQUIREMENTS (R&M INTEGRATION, ...)
  - TECHNICAL STANDARDS (CGM, ODA/ODIF, ...)
  - APPLICATION AREAS (TRAINING, TECH DATA PACKAGES, ...)
- GROUNDWORK FOR PHASE II CORE
  - INDUSTRY CO-OP FOR PHASE I DEVELOPMENT
  - GOVERMENT COORDINATION GROUP
- DEVELOPMENT OF INTEGRATING ARCHITECTURE
- CONTINUED WORK WITH INDUSTRY TASK FORCE ON CALS IMPLEMENTATION ISSUES

CALS SCHEDULE OBJECTIVES



CALS PAYOFFS

- DESIGNED-IN RELIABILITY & MAINTAINABILITY IMPROVEMENTS
- ACCURATE, TIMELY TECHNICAL DATA
- BETTER CONFIGURATION MANAGEMENT
- IMPROVEMENTS IN LOGISTICS PLANNING LEAD TIME
- REDUCED COSTS FOR WEAPON SYSTEM ACQUISITION AND SUPPORT
- ENHANCE U.S. COMPETITIVE EDGE

Electronic Data Interchange

Ben Milbrandt

Logistics Management Institute

Electronic Data Interchange

Ben Milbrant

Electronic data interchange is basically exchanging of documents. It's a way to tie in your application systems to talk to my application systems. In fact, NAVISTAR, formerly International Harvester, would not be operating today if we had not been able to implement electronic data interchange seven years ago. Seven years ago, just like all the other automotive industry, we were losing money at a record pace. In fact, in the first eighteen months of implementing electronic data interchange, we were able to reduce our inventory by $167,000,000, and therefore generate the cash we needed to survive as a corporation. This story is being repreated all across the United States. Because we're giving a better exchange of information, our suppliers are better able to reduce their inventories, to control their costs, and to compete with offshore competition.

When the automotive industry started to use electronic data interchange methods, each company had its own proprietary format. It was very expensive for suppliers to support all of those formats. The automotive industry started to develop its own standard formats, but instead adopted standard formats being developed on a broader basis by the American National Standards Committee X12. Now those standards are endorsed by almost every industry in the U.S.

The benefits of using electronic data interchange standards are:

Increased Record Accuracy If I can get information from my computer into your computer without either one of us having to manually key enter that information, then we reduce errors. In information that is handled manually, we have about a one percent error rate, and that can be costly.

Reduced Data Entry Costs If someone doesn't have to enter information into the computers, if computers can talk to each other, there are no data entry costs.

Reduced Mailing Costs It costs anywhere from twenty-two cents to several dollars to get a document from one place to another. The cost of the postage is a small amount. The data entry cost, the handling, somebody getting it to the right department, somebody making sure that it's in the right application area, somebody actually being able to make sure that the information was received, costs a tremendous amount.

Reduced Paper Work Electronic data interchange can save money by reducing the mundane, routine process of handling information.

Increased Customer Satisfaction With our electronic data interchange system that we have tied in with our dealer network, if there's a stock outage at a particular location, today that order is in the hand of our supplier within an hour, and many times shipped within four hours. It's received the next day, or many times, the same day. That means customer satisfaction and more sales.

Reduced Inventory We had to reduce our inventory and had to document it. We knew because the banks were looking very closely over our shoulder. Within the Springfield Truck Division (I was Material Manager at the time) we needed $200,000,000 to survive. We came up with $167,000,000; the other divisions came up with the rest.

Reduced Inventories for Our Suppliers Our suppliers have said that electronic data interchange reduces their inventory by 80 percent as well. That increased exchange of information allows us all to give better information in a more timely fashion. The system has been so successful at NAVISTAR that all of the truck manufacturers within the United States are working now within the Automotive Industry Action Group, remodeling their systems after our systems. We found that exchange of information not only among our suppliers, but also among our competitors, makes us all more efficient.

Better Cash Management Electronic Data Interexchange means that companies can carry less cash in the bank. They know exactly how much money they need to cover checks written. When funds are exchanged electronically, the exchange of funds is negotiated with the supplier. We have reduced our inventory and reduced our costs to the tune of $65,000,000. Now, that's not much when you compare some of the budgets that you look at today, but in fact, this year we'll make about $130,000,000, finally, after a number of years of struggling with losses. Now, there were many many things that we changed, but we can directly attribute $65,000,000 worth of our costs, $65,000,000 worth of our profits this year to electronic data interchange. It's making us much more efficient. It's making all of the industries in America much more efficient. It gives us standards to work with so that in fact, the same standards that I communicate with can work for everybody else in the audience. They absolutely are working today.

Session 2 - Making Incompatible Applications Communicate-Software Portability

Office Document Architecture and Interchange

Lawrence Welsch

National Bureau of Standards

Office Document Interchange

Real Problems?

Possible Solutions?

Office Document Interchange

Problems

Signature line on a blank page

Section header at a bottom of a page

Line break on the wrong word

Office Document Interchange

Documents ≡ Content + Form

Office Document Interchange

Where did the problems come from?

Different computer hardware

Different computer software

Lack of understanding that form is important

Decrease in price of technology

Increase in capability of technology

Office Document Interchange

What are the Solutions?

We all use brand X

A document is a program

Content is all that is important

Brand X to brand Y translator

Interchange format

Distributed Office Application Model

Robert Christie

Control Data Corporation

Distributed Office Applications Model

What is it?

- A common architecture to support integrated office services in a multi-vendor distributed office environment.

- Based on ISO DIS 9072 (Remote Operations Service Element) the standard provides guidelines for design of protocols which allow access to various applications and interactions between the applications.

- These applications may be distributed over local "closely-coupled" office systems or wide area networks of significant physical distances.

- This standard provides unifying principles for structuring distributed office applications and gives the basic concepts of Service Access Protocols for users of these applications and intra-service protocols for the cooperating servers of a Distributed Office Applications service.

Why do we need a DOA model?

- Distributed Office Applications are used by an integrated distributed office system consisting of user nodes and server nodes linked by a network. The user nodes access the server nodes via the network using access protocols.

In such an environment, data processing applications, that within a single host system act as a single piece, have been split among the different intelligent components of the system. This splitting has led to the need for standardization of interrelationships between the different parts of an application.

Distributed Office Applications Objectives

- Allow easier implementation of application processes developed for distributed environment based micro-processors and large and medium sized mainframes which are interconnected through LAN or WAN.
- Reduce the processing delay time for document related activities such as document filing and retrieval, document distribution, printing, etc., and group communications related activities such as interpersonal messaging, user directory and authentication processes, etc.
- Allow conconcurrent processing of different tasks within the distributed office system.
- Reduce overall size of an office system, and
- Facilitate modular extension of an office system.

Distributed Office Applications Model

A multi-part Standard

- Part 1 General Model
- Part 2 Referenced Data Transfer
- Part 3 Security Framework
- Part 4 Management

Part 1 General Model
ISO/TC97/SC-18/WG-4 Tokyo 58, September 1987

- Introductory Material - Clauses 1.0 through 6.0. References, definitions, and abbreviations.

- Statement of Requirements to be satisfied by the model framework, clause 7.0.

- Fundamental Concepts associated with distributed office applications, including the basic concepts needed to define the relationships between generic communicating elements, clause 8.0.

- Naming Concepts - Clause 9.0. Needed for distributed office applications.

- Operation of Supportive Applications - Clause 10.0. Time base, supportive security applications, directory, third party transfer.

- Operation of Productive Applications - Clause 11.0. Message transfer, mailbox, document filing and retrieval, printing.

- Guidelines for the Design of Access Protocols - Clause 12.0. Concepts, notation, application rules.

-	Annex A	Future applications
-	Annex B	Abstract service definition of DOAM
-	Annex C	Examples of interactions between users and applications performing productive and supportive functions
-	Annex D	Comparison of abstract operations defined in some distributed applications

DOAM Supportive Services

- Time Base
- Directory Services
- Reference Data Transfer Services
- Security Services
    - Authentication
    - Authorization
- Management Services

DOAM Productive Services

- Message Transfer Service
- Mailbox Service
- Document Filing and Retrieval Service
- Print Services
- Interpersonal Communications
- Electronic Business Data Interchange
- Change/Transfer Processing?
- Possible Data Base Management?

Part 2 Referenced Data Transfer
ISO/TC97/SC-18/WG-4 Tokyo 59, September 1987

- Introductory Material - Clauses 1.0 through 6.0. References, definitions, and abbreviations.

- Referenced Data Transfer Facility - Functional model, architectural model, generic operations, specific operations, reference logical structures, clause 7.0.

- Reference - Abstract syntax, impact on access protocols, clause 8.0.

- Service Elements - Service element description, abstract syntax, clause 9.0.

- RDT Context - Overview, definition of context, bind operations, remote operation priorities, conformance, clause 10.0.

    - Annex A RDT Macro (to be supplied for backward compatibility with ECMA - 112).

Part 3 Security Framework
ISO/TC97/SC-18/WG-4 Tokyo 60, September 1987

- Introductory Material - Clauses 1.0 through 6.0. References, definitions, and abbreviations.

- Security Requirements for Distributed Office Applications - Clause 7.0.

- Secure Systems Model - Clause 8.0 (to be supplied).

A working document of 10 pages from ISO/TC97/SC-18/WG-1 and NATO, ECMA documents.

Part 3 Security Framework
ISO/TC97/SC-18/WG-4 Tokyo 61, September 1987

- Introductory Material - Clauses 1.0 through 6.0. References, definitions, and abbreviations.
- Distributed Processing Terminology and Concepts - Clause 7.0.
- Objectives and Functions of Management - Clause 8.0.
- Management Functions - Clause 9.0.
- Domains - Clause 10.0.
    - Annex A Users of Management

A working document based on "Distributed Systems Management" -- Distributed Systems Management Study Group, U.K., Chair - Dr. Alwyn Langsford (UKAEA).

-Slide 16-

Relationship of DOA and ODP Models

- DOA = Distributed Office Applications ISO/TC97/SC-18
- ODP = Open Distributed Processing ISO/TC97/SC-21

-Slide 17-

ODPM is defined as identifying and interrelating to several types of interface in a distributed system.

DOAM is defined as "standardization of the model, architectural framework and design principles needed for interconnecting systems supporting Distributed Office Services.

Slide 18-

Thus DOAM is an interconnection model of office systems components and only needs to address a subset of elements of the general ODP Model.

This will require close liaison between ISO/TC97/SC-18 and ISO/TC97/SC-21.

I Have a Dream! I Have a Dream!

Most of you can remember this from Dr. Martin Luther King in 1963. My dream is also about segregation and integration but not of people themselves, but their communications.

We must support OPEN Systems Interconnect in the late 1980's and 1990's. We must work for GLOBAL communications and distributed applications to help mankind worldwide.

How can you help?

- Find and support qualified representatives to ANSI Standards groups and ISO Standards groups.
- Support committee on open systems, NBS Sig groups, and other Standards activities.
- Yes, times are tight, the Dow Jones is down, and we are worried about recessions, but we must still find the time and funds to support Standards.

Thank you.

1867a

Distributed Office Applications Model

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A common architecture to support integrated office services in a multi-vendor distributed office environment.

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- Allow conconcurrent processing
- Reduce overall size
- Facilitate modular extension

Distributed Office Applications Model

A multi-part Standard

- Part 1 General Model
- Part 2 Referenced Data Transfer
- Part 3 Security Framework
- Part 4 Management

Part 1 General Model

ISO/TC97/SC-18/WG-4 Tokyo 58, September 1987

- Introductory Material
- Statement of Requirements
- Fundamental Concepts
- Naming Concepts
- Operation of Supportive Applications
- Operation of Productive Applications
- Guidelines for the Design of Access Protocols
- Annexes

DOAM Supportive Services

- Time Base
- Directory Services
- Reference Data Transfer Services
- Security Services
    - Authentication
    - Authorization
- Management Services

DOAM Productive Services

- Message Transfer Service
- Mailbox Service
- Document Filing and Retrieval Service
- Print Services
- Interpersonal Communications
- Electronic Business Data Interchange
- Cnange/Transfer Processing?
- Possible Data Base Management?

Part 2 Referenced Data Transfer

ISO/TC97/SC-18/WG-4 Tokyo 59, September 1987

- Introductory Material
- Referenced Data Transfer Facility
- Reference
- Service Elements
- RDT Context
  - -Annex A

Part 3 Security Framework

ISO/TC97/SC-18/WG-4 Tokyo 60, September 1987

- Introductory Material
- Security Requirements for Distributed Office Applications
- Secure Systems Model

Part 4 Management

ISO/TC97/SC-18/WG-4 Tokyo 61, September 1987

- Introductory Material
- Distributed Processing Terminology and Concepts
- Objectives and Functions of Management
- Management Functions
- Domains
  - -Annex A

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This will require close liasion between ISO/TC97/SC-18 and ISO/TC97/SC-21.

Operating Systems Standards

Roger Martin
National Bureau of Standards

POSIX FIPS

THE CORNERSTONE OF APPLICATIONS PORTABILITY

Roger J. Martin

Institute for Computer
Sciences & Technology
National Bureau of Standards

December 3, 1987

OBJECTIVES

- Provide vendor independent way for federal agencies to specify Unix system Requirements

- Promote application portability among federal Unix based systems.

NBS PLANS

-- Adopt POSIX as a Federal Information Processing Standard

-- Develop tests to measure conformance to the standard

-- Support adoption of POSIX as an international standard

Current Standards Activities

IEEE - POSIX	1003.1	POSIX Standard
	1003.2	Shell and Tools
	1003.3	Test Method Specifications
	1003.4	Real Time
AT&T	SVID	System V Interface Definition
	SVVS	System V Verification Suite
X/OPEN		Portability Guide
	VSX	Validation Suite
NBS	PCTS	Posix Conformance Test Suite to test conformance to the POSIX FIPS
/usr/group		Working groups on related POSIX issues

NBS PRODUCTS

- Federal Information Processing Standard (FIPS)
- POSIX Conformance Test Suite

POSIX / FIPS

- Based on P1003.1 Draft #12
- Some changes to resolve issues
- Specify which options will be included

NBS PCTS

- Support from IEEE P1003.3, AT&T, Hewlett Packard, X/OPEN, DEC, Perennial
- Based on AT&T SVVS Subset
- Tests conformance to the POSIX FIPS
- Place source code in public domain
- Encourage 3rd party testing services
- Maintain and update test suite as standard evolves

Schedule

P1003.1 POSIX Ballot - Nov. '87
Approved - March '88

P1003.2 Shell & Tools
Ballot - late '88 / early '89

P1003.3 Test Method Specifications
Final Draft - April '88
Ballot - May '88
Approved - Sept. '88

P1003.4 Real Time (schedule being established)

NBS PCTS NBS Conformance Test Suite for POSIX FIPS
Initial Version - Jan 1988
Update - [redacted] April 1988

X3J11 "C" Language Standard
ANSI Std - late '88 or early '89

NBS Goals

Promote applications portability through the use of open systems architecture and non-proprietary standards.

Promote acceptance of NBS PCTS as the basis for both national and international validation services for POSIX.

APPLICATION PORTABILITY ISSUES

- IDENTIFICATION OF THE FUNCTIONAL CHARACTERISTICS OF THE ARCHITECTURE
- NON-PROPRIETARY SPECIFICATIONS
- DEVELOPING APPROPRIATE BINDINGS
- VENDOR COMMITMENT TO USE SPECIFICATIONS IN BUILDING PRODUCTS
- USER COMMITMENT TO USE SPECIFICATIONS IN PROCUREMENTS
- CONFORMANCE TESTING

AN EMERGING APPLICATIONS ARCHITECTURE

Function

Operating System

Data Base Management

Data Interchange
- Business Graphics
- Engineering Graphics
- Document Processing

Network Services
- Data Communications
- File Management
- Interprocess Comunications

User Interface

Languages

AN EMERGING APPLICATIONS ARCHITECTURE

Function	Element
Operating System	POSIX
Data Base Management	SQL IRDS
Data Interchange	
- Business Graphics	GKS & CGM
- Engineering Graphics	IGES
- Document Processing	SGML ODA/ODIF
Network Services	
- Data Communications	OSI
- File Management	NFS
- Interprocess Comunications	OSI
User Interface	XWindows
Languages	C COBOL FORTRAN ADA PASCAL

APPLICATIONS PORTABILITY ARCHITECTURE

Function	Element	Interface Specification
Operating System	Extended POSIX	IEEE P1003.1 + Extensions
Data Base Management	SQL	FIPS 127
	IRDS	
Data Interchange		
- Business Graphics	GKS & CGM	FIPS 120, 128
- Engineering Graphics	IGES	NBSIR 86-3359
- Document Processing	SGML	ISO 8879-1986
	ODA/ODIF	ISO/DIS 8613
Network Services		
- Data Communications	OSI	GOSIP
- File Management	NFS	
- Interprocess Comunications	OSI	GOSIP
User Interface	XWindows	Xlib-C language XInterface Protocol Version 11
Languages		
	C	X3J11
	COBOL	FIPS 021-2
	FORTRAN	FIPS 069-1
	ADA	FIPS 119
	PASCAL	FIPS 109

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Data Base Management Systems

Donald Deutsch

General Electric

DATABASE MANAGEMENT SYSTEM STANDARDS

REPORT OF PAST PROGRESS
AND
FUTURE PROSPECTS

TO

SYSTEMS COMMUNICATING WITH SYSTEMS

GSA/NBS INFORMATION RESOURCES MANAGEMENT SYMPOSIUM

3 DECEMBER 1987

DONALD R. DEUTSCH

G.E. INFORMATION SERVICES

AGENDA

DBMS STANDARDIZATION STATUS

FRAMEWORK FOR DBMS STANDARDIZATION

- ROOTS OF DBMS PRODUCTS
- SOURCES OF STANDARDS

ANSI/X3 DBMS STANDARDIZATION

- RECAP
- X3H2 DATABASE COMMITTEE

NDL AND SQL STANDARDS

- OVERVIEW
- DATABASE LANGUAGE NDL VS CODASYL PRODUCTS
- DATABASE LANGUAGE SQL VS SQL PRODUCTS

DBMS STATE-OF-THE-ART

FUTURE DBMS DIRECTIONS

DBMS STANDARDIZATION STATUS

BEFORE, THERE WERE NO DOMESTIC U.S. OR INTERNATIONAL DATABASE MANAGEMENT SYSTEM STANDARDS.

TODAY, THERE ARE TWO APPROVED BY:

ANSI	(AMERICAN NATIONAL STANDARDS INSTITUTE)
ISO	(INTERNATIONAL STANDARDS ORGANIZATION)
FIPS	(FEDERAL INFORMATION PROCESSING STANDARD)

SOON, THERE WILL BE MORE!

ROOTS OF DBMS PRODUCTS

COMMERCIAL DEVELOPMENT

HARDWARE VENDORS

GE/HIS - IDS
IBM - IMS AND DB2
SPERRY - DMS 1100

PROPRIETARY SOFTWARE VENDORS

SOFTWARE AG - ADABAS
CULLINET - IDMS AND IDMS/R
ASHTON TATE - DBASE III

UNIVERSITY/GOVERNMENT LABORATORIES

SDC/U. OF TEXAS - SYSTEM 2K
U. OF CALIFORNIA, BERKELEY - INGRES

VOLUNTARY SPECIFICATION SHARING

UNILATERAL, E.G., IBM SYSTEM R => ORACLE
DEVELOPMENT BODIES, E.G., CODASYL => IDMS, DBMS 10, DMS 1100
NATIONAL AND INTERNATIONAL STANDARDS

SOURCES OF STANDARDS

STANDARDS SETTING ORGANIZATIONS (ISO)

- INTERNATIONAL STANDARDS ORGANIZATION (ISO)
- NATIONAL STANDARDS BODIES, E.G., ANSI
- FEDERAL GOVERNMENT STANDARDS - FIPS, DOD
- OTHER, E.G., IEEE

DEVELOPMENT BODIES

- CODASYL
- OTHER

OTHER BODIES

- ECMA

DEFACTO MARKETPLACE STANDARDS, E.G., SQL, MSDOS

ANSI/X3 DBMS STANDARDIZATION RECAP

1978 X3 INITIATED THREE DBMS STANDARDS EFFORTS (BASED ON 1978 CODASYL SPECIFICATIONS)

- o DATA DEFINITION LANGUAGE (DDL) - X3H2
- o COBOL DATA MANIPULATION LANGUAGE (DML) - X3J4
- o FORTRAN DML - X3J3

1980 X3J4 DECIDED TO OMIT THE DML FROM COBOL 198X

1981 X3H2 COMPLETED DDL WORK, BUT LACK OF A DML PRECLUDED ITS BEING FORWARDED TO X3 FOR APPROVAL AS AN AMERICAN NATIONAL STANDARD (ANS). NEEDED DATA MODEL FOCUS.

X3H2 REQUESTED X3 APPROVAL TO PRODUCE A STANDARD COVERING DDL AND DML; X3 AGREED AND RENAMED X3H2 THE DATABASE COMMITTEE.

1982 X3 INITIATED RELATIONAL DBMS STANDARDS EFFORT

- o RESPONSE TO SPARC/DBSSG
- o PROJECT ASSIGNED TO X3H2
- o SQL SELECTED AS BASE

1985 BOTH NDL AND SQL FORWARDED TO X3 FOR APPROVAL.

1986 NDL AND SQL APPROVED AS AMERICAN NATIONAL STANDARDS, THIRD AND FOURTH QUARTERS RESPECTIVELY.

1987 FIRST QUARTER APPROVAL OF NDL AND SQL BY BOTH ISO AND FIPS.

FIRST ADDENDUM TO SQL FOR REFERENTIAL INTEGRITY RELEASED FOR PUBLIC REVIEW AND COMMENT BY BOTH ISO AND ANSI.

ANSI X3H2 DATABASE COMMITTEE

FOCUS OF WORLD-WIDE DBMS STANDARDIZATION EFFORT OVER PAST NINE YEARS

EVOLUTIONARY CHANGES IN APPROACH AND SCOPE OF EFFORT

PARTICIPATION CHANGING BUT STILL BIASED TOWARDS IMPLEMENTORS:

- INITIALLY DOMINATED BY HARDWARE MANUFACTURERS
- INCREASING INFLUENCE OF PROPRIETARY SOFTWARE VENDORS

NDL PRECURSOR BENEFITTED SQL EFFORT

- DATA MODEL FOCUS: SINGLE SPECIFICATION FOR DML SEMANTICS AS WELL AS DDL SYNTAX AND SEMANTICS
- FORMAL SPECIFICATION FORMAT AND STYLE

FOCUSING NOW ON:

SQL EXTENSIONS
DISTRIBUTED DATABASE PROCESSING

Analysis of Participants by Organizational Affiliation
ANSI X3H2, Database
10/22/87

Organizations		Participation Status							
		A	AD	L	M	O	PM	X	Total
ABA	-American Bankers Assoc	1	0	0	1	0	0	0	2
ADR	-Applied Data Research	1	0	0	1	0	0	0	2
AMOCO	-AMOCO Corporation	0	0	0	1	0	0	0	1
ARMY	-U.S. Army	1	0	0	1	0	0	0	2
AT&T	-AT&T	1	0	0	1	0	0	0	2
BELLCORE	-Bell Comm Research	0	1	0	1	0	0	0	2
CCA	-Computer Corp of America	1	0	0	1	0	0	0	2
CCC	-Concurrent Computer Corp	0	0	0	1	0	0	0	1
CDC	-Control Data Corporation	1	0	0	1	0	0	0	2
CSDT	-CompuServe Data Tech	1	0	0	1	0	0	0	2
CUBE	-Coop Users of Burroughs Eqp	0	0	0	1	0	0	0	1
CULLINET	-Cullinet Software, Inc.	1	0	0	1	0	0	0	2
DEC	-Digital Equipment Corp	2	0	0	1	0	0	0	3
DG	-Data General Corporation	1	0	0	1	0	0	1	3
DLC	-Data Language Corporation	1	0	0	1	0	0	0	2
EXTSYS	-Extended Systems	0	0	0	1	0	0	0	1
GE	-General Electric	1	0	0	2	0	0	0	3
GM	-General Motors	0	0	0	1	0	0	0	1
HB	-Honeywell Bull	1	0	0	1	0	0	0	2
HP	-Hewlett-Packard Company	1	1	0	1	0	0	0	3
IBM	-Intl Business Machines	0	0	0	1	0	0	0	1
ICL	-Intl. Computers Limited	0	0	0	1	0	0	0	1
IDA	-Institute for Defense Analy	0	0	0	1	0	0	0	1
INFORMIX	-Informix Software, Inc.	2	0	0	1	0	0	0	3
MDBS	-Micro Data Base Systems	0	0	0	1	0	0	0	1
MDC	-McDonnell Douglas Corp.	1	0	0	1	0	0	0	2
MMES	-Martin Marietta E S, Inc.	1	0	0	1	0	0	0	2
MSI	-Must Software Intl	1	0	0	1	0	0	0	2
NAVY	-US Navy	0	0	0	1	0	0	0	1
NBS	-US Natl Bureau of Stds	1	0	1	2	0	0	0	4
NCR	-NCR Corporation	0	0	0	1	0	0	0	1
NSA	-US Natl Security Agency	1	0	0	1	0	0	0	2
NU	-Northrop University	0	0	0	1	0	0	0	1
ORACLE	-ORACLE Corp	1	0	0	1	0	0	0	2
P&G	-Procter & Gamble	1	0	0	1	0	0	0	2
PACCAR	-PACCAR, Inc.	0	0	0	1	0	0	0	1
PAS	-City of Pasadena	0	0	0	1	0	0	0	1
PLEXUS	-Plexus Computers	0	0	0	1	0	0	0	1
PMM	-Peat Marwick Main & Co.	0	0	0	1	0	0	0	1
PSI	-Pansophic Systems Inc.	1	0	0	1	0	0	0	2
RACOM	-RACOM Computer Professionals	0	0	0	1	0	0	0	1
RTI	-Relational Technology Inc	1	0	0	1	0	0	0	2
SAS	-SAS Institute, Inc.	0	0	0	1	0	0	0	1
SGI	-Sierra Geophysics, Inc.	1	0	0	1	0	0	0	2
SIR	-SIR Inc.	0	0	0	1	0	0	0	1
TANDEM	-Tandem Computers, Inc.	1	0	0	1	0	0	0	2
TERADATA	-Teradata Corporation	1	0	0	1	1	0	0	3
TI	-Texas Instruments	0	0	0	1	0	0	0	1
UNIFY	-UNIFY Corp	1	0	0	1	0	0	0	2
UNISYS	-UNISYS Corporation	1	0	0	2	0	0	0	3
USAF	-US Air Force	1	0	0	1	0	0	0	2
VGS	-VGS, Inc.	0	0	0	1	0	0	0	1
WANG	-WANG Laboratories Inc.	0	0	0	1	0	0	0	1
WIS	-Whitemarsh Info Systems	0	0	0	1	0	0	0	1
ZYCOR	-ZYCOR Inc.	0	0	0	1	0	0	0	1
ZZZ	-NONE	0	6	7	0	18	6	0	37
Totals >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>		32	8	8	58	19	6	1	132

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NDL AND SQL OVERVIEW

	NDL	SQL
REFERENCES:		
NAME	DATABASE LANGUAGE NDL	DATABASE LANGUAGE SQL
ANSI	X3.133-1986	X3.135–1986
ISO	IS 8907	IS 9075
FIPS	NBS FIPS 126	NBS FIPS 127
CHARACTERISTICS:		
TIMELINESS	TRAILS TECHNOLOGY AND MARKET	TRYING TO "LEAD THE PARADE"
FUNCTION	SOME 'TRUTH AND BEAUTY": FIXED CODASYL BUMPS AND FILLED HOLES	PRAGMATIC SUBSET OF EXTANT PRODUCTS; ABORTED 18 MONTH EFFORT TO DEFINE "TRUTH AND BEAUTY"

DATABASE LANGUAGE NDL VS CODASYL PRODUCTS

SINGLE NDL COMPARED TO PARTIAL IMPLEMENTATIONS OF A SERIES OF CODASYL SPECIFICATIONS

NO STORAGE ORIENTED FEATURES: CALC, AREA, . . .

LANGUAGE INDEPENDENT DDL SYNTAX; I.E., REMOVED COBOLIsms

ADDITIONAL DATA TYPES TO MATCH STANDARD PROGRAMMING LANGUAGES

MINIMAL ACCESS CONTROL (SECURITY)

ANSI CHARTERED TO DEFINE LANGUAGE BINDINGS FOR NDL;

NO OTHER EXTENSIONS IN PROCESS

DATABASE LANGUAGE SQL VS SQL PRODUCTS

NO STORAGE-ORIENTED FEATURES: SEGMENTS, TABLS SPACE, . . .

NO "DYNAMIC SQL": PREPARE, EXECUTE

NO CREATE INDEX

- INDEXES WILL BE IMPLEMENTOR DEFINED
- UNIQUE SPECIFICATION FOR COLUMNS IS PART OF THE TABLE DECLARATION

ADDITIONAL DATA TYPES TO MATCH STANDARD PROGRAMMING LANGUAGES

DYNAMIC CREATE, ALTER, GRANT AND REVOKE STATEMENTS ARE IMPLEMENTOR DEFINED

- STANDARD DEFINES TABLES, VIEWS AND PRIVILEGES WITH STATIC DATA DESCRIPTIONS
- IMPLEMENTORS CAN USE A UTILITY PROGRAM TO PROCESS TABLE, VIEW AND PRIVILEGE DEFINITIONS

ANSI/X3H2 AND ISO WORKING ON SQL EXTENSIONS
AND FORMALIZING/DEFINING LANGUAGE BINDINGS

DBMS STATE-OF-THE-ART

DATA MODEL FOCUS

STANDARDS AND MOST PRODUCTS LIMITED TO

- CENTRALIZED DATABASE
- SINGLE PROCESSOR DBMS

ANSI/ISO/FIPS STANDARDS

- ALLOW "PORTABLE" DBMS APPLICATIONS (FINALLY!)
- NECESSARY FOUNDATION FOR DISTRIBUTED DATABASE TECHNOLOGY

EMERGENCE OF SQL AS DBMS "LINGUA FRANCA"

- PROLIFERATION OF SQL PRODUCTS
- VIRTUALLY ALL NEW (AND MANY EXISTING) PRODUCTS HAVE AN SQL INTERFACE REGARDLESS OF UNDERLYING DATA MODEL

MANY BUSINESS/AGENCIES FORMULATING MIXED STRATEGY:

- PRESERVE INVESTMENT IN EXISTING (NON-SQL) APPLICATIONS
- BIAS TOWARD SQL FOR NEW APPLICATIONS AND EXTENSIONS TO EXISTING APPLICATIONS

FUTURE DBMS DIRECTIONS

PERFORMANCE IMPROVEMENTS FOR SQL PRODUCTS

- NECESSARY TO MAINTAIN MOMENTUM
- HARDWARE MICROCODE FOR SQL FUNCTIONS

ADD FUNCTIONALITY TO ANSI/ISO SQL STANDARDS

- REFERENCTIAL INTEGRITY (1988)
- ADDITIONAL FEATURES (1989-90)

FOCUS ON DISTRIBUTED DATABASE MANAGEMENT

- SQL STANDARD PROVIDES ESSENTIAL BUILDING BLOCK
- NEW PRODUCT ANNOUNCEMENTS: SINGLE VENDOR SOLUTION
- REMOTE DATABASE ACCESS EFFORT WITHIN ISO AND ANSI

MULTI-VENDOR HARDWARE/SOFTWARE DISTRIBUTED
DATABASE APPLICATIONS IS REASONABLE GOAL

Distributed Data Base Applications

Chris Reedy

Computer Corporation of America

Database Management consists of:

- o Manipulation of Data
- o Data Dictionary
- o Concurrency, Integrity and Recovery

No model for Database Management corresponding to OSI model for communications

Data Dictionary Standards and others

E/R Model and IRDS

Relational Models

Object Models

No "standards" for distributed data administration

Entity/Relationship (E/R) Model

- o De Facto Standard for Data Modeling

Information Resource Dictionary System (IRDS)

- o Dictionary Standard based on E/R Model

Issues:

- o IRDS primarily for human users
- o No DBMSs use E/R model

Relational Model

- o Relational DBMS products exist

Issues:

- o Not as richly expressive as E/R Model

Object Models

- Highly expressive for data semantics
- Flexible and Extensible
- Some products appearing

Standards unlikely in near-term

Data Manipulation Standards

SQL

- o Basis of Remote Data Access Protocol (RDAP)
- o Manipulates Data by Value
- o Can Manipulate Sets of Records

Issues:

- o Weak in Data Dictionary Area
- o Many Extensions among SQL Products
- o Standard will be extended

Concurrency, Integrity and Recovery

Problems:

- o Reliable Distributed Update
- o No standards for Centralized DBMSs
- o No standard form of Two-Phase Commit
  (Commercial Products coming)

CCR Communications Standard Exists

Near-Term Solutions: Ad Hoc

A User's Perspective of the Standards Process

Joanna Vanderwilt

Boeing Commercial Airplane Co.

VISIBILITY

INFORM THE DATA USING PUBLIC OF STANDARDS TO INCREASE SUPPORT AND PARTICIPATION

PROVIDE OPEN PUBLIC COMMUNICATIONS AND RAPID INFORMATION EXCHANGE

COORDINATE AND INTEGRATE THE WHOLE DATA STANDARDS PROCESS

"NO LONGER THE EXCLUSIVE TOOLS OF SCIENTISTS AND ENGINEERS, COMPUTERS ARE NOW COMMON IN OUR OFFICES, FACTORIES, AND SCHOOLS."

- NBS

NO LONGER THE EXCLUSIVE PREOCCUPATION OF SCIENTISTS AND ENGINEERS, THE STANDARDS DEVELOPMENT PROCESS NOW AFFECTS ORDINARY DATA USERS IN OUR OFFICES, FACTORIES, AND SCHOOLS; AND THEY DESERVE TO BE INFORMED OF BOTH THEIR RIGHTS AND THEIR RESPONSIBILITIES.

TYPICAL INDUSTRIAL ENVIRONMENT FOR DATA USERS

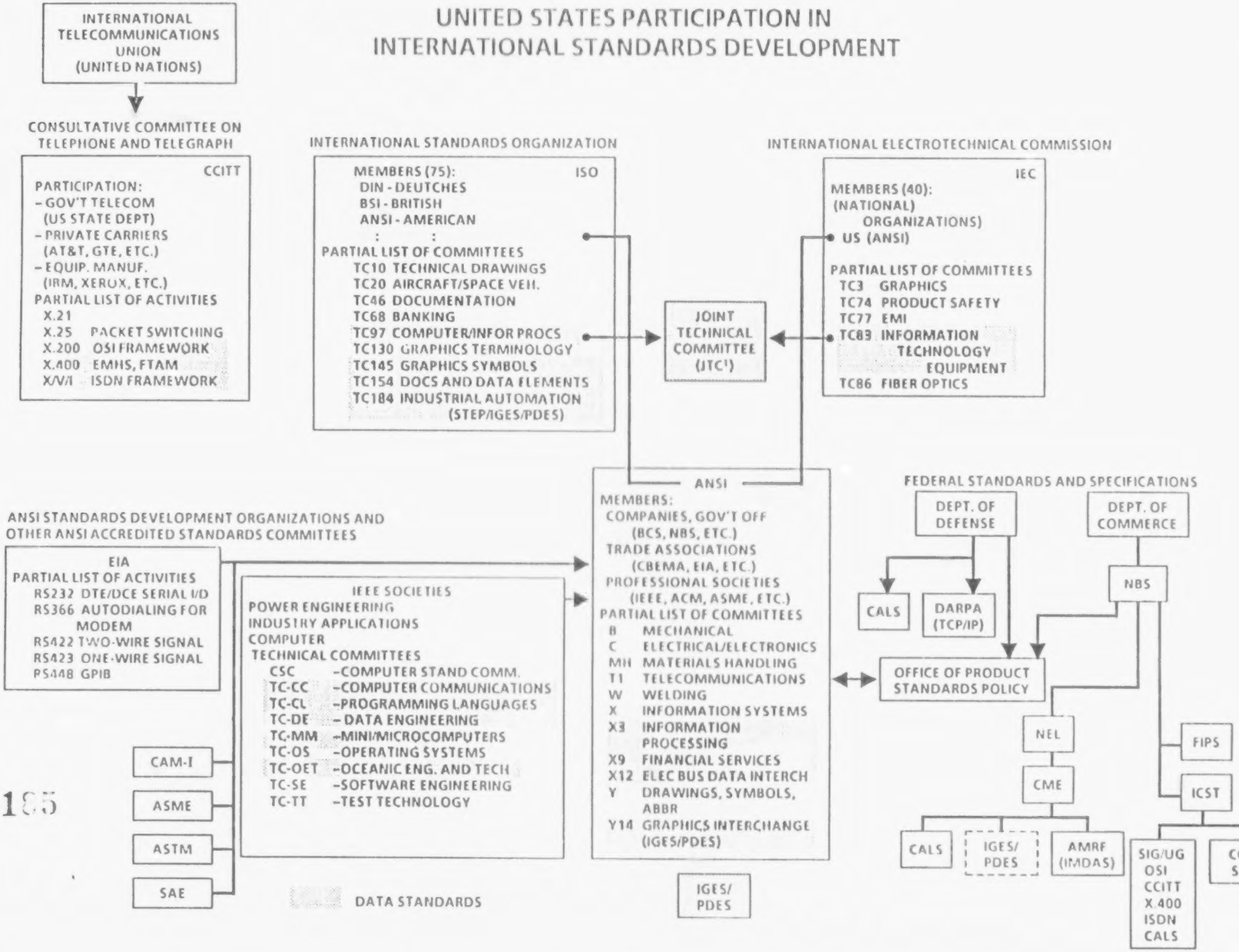
- CANNOT ACCESS LONG DISTANCE LINES
- CANNOT WRITE COMPANY CORRESPONDENCE
- HAS NO PETTY CASH - ONLY AUTHORIZED PURCHASES
- USES LOCAL AND INDUSTRIAL STANDARDS
- ASSUMES NBS MAKES NATIONAL STANDARDS (DO THEY?)
- OCCASIONALLY SEES TERMS "ISO" AND "ANSI" IN NEWS BRIEFS
- TOTALLY UNAWARE OF INFORMATION SYSTEM STANDARDS

ANSI REQUIRES

"THE CONSENSUS OF MORE THAN JUST A SIMPLE MAJORITY OF THOSE DIRECTLY AND MATERIALLY AFFECTED,"

YET PROVIDES NO PUBLICITY TO INFORM DATA USERS OF THE EXISTENCE OF ANSI AND THE DATA STANDARDS DEVELOPMENT PROCESS.

UNITED STATES PARTICIPATION IN INTERNATIONAL STANDARDS DEVELOPMENT



INTERNATIONAL
TELECOMMUNICATIONS
UNION
(UNITED NATIONS)

CONSULTATIVE COMMITTEE ON
TELEPHONE AND TELEGRAPH

CCITT
PARTICIPATION:
- GOV'T TELECOM
  (US STATE DEPT)
- PRIVATE CARRIERS
  (AT&T, GTE, ETC.)
- EQUIP. MANUF.
  (IBM, XEROX, ETC.)

PARTIAL LIST OF ACTIVITIES
X.21
X.25 PACKET SWITCHING
X.200 OSI FRAMEWORK
X.400 EMHS, FTAM
X/V/I ISDN FRAMEWORK

INTERNATIONAL STANDARDS ORGANIZATION

ISO
MEMBERS (75):
DIN - DEUTCHES
BSI - BRITISH
ANSI - AMERICAN
: :

PARTIAL LIST OF COMMITTEES
TC10 TECHNICAL DRAWINGS
TC20 AIRCRAFT/SPACE VEH.
TC46 DOCUMENTATION
TC68 BANKING
TC97 COMPUTER/INFOR PROCS
TC130 GRAPHICS TERMINOLOGY
TC145 GRAPHICS SYMBOLS
TC154 DOCS AND DATA ELEMENTS
TC184 INDUSTRIAL AUTOMATION (STEP/IGES/PDES)

JOINT
TECHNICAL
COMMITTEE
(JTC¹)

INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC
MEMBERS (40):
(NATIONAL ORGANIZATIONS)
US (ANSI)

PARTIAL LIST OF COMMITTEES
TC3 GRAPHICS
TC74 PRODUCT SAFETY
TC77 EMI
TC83 INFORMATION TECHNOLOGY EQUIPMENT
TC86 FIBER OPTICS

ANSI STANDARDS DEVELOPMENT ORGANIZATIONS AND
OTHER ANSI ACCREDITED STANDARDS COMMITTEES

EIA
PARTIAL LIST OF ACTIVITIES
RS232 DTE/DCE SERIAL I/D
RS366 AUTODIALING FOR MODEM
RS422 TWO-WIRE SIGNAL
RS423 ONE-WIRE SIGNAL
RS448 GPIB

IEEE SOCIETIES
POWER ENGINEERING
INDUSTRY APPLICATIONS
COMPUTER
TECHNICAL COMMITTEES
CSC -COMPUTER STAND COMM.
TC-CC -COMPUTER COMMUNICATIONS
TC-CL -PROGRAMMING LANGUAGES
TC-DE - DATA ENGINEERING
TC-MM -MINI/MICROCOMPUTERS
TC-OS -OPERATING SYSTEMS
TC-OET -OCEANIC ENG. AND TECH
TC-SE -SOFTWARE ENGINEERING
TC-TT -TEST TECHNOLOGY

CAM-I
ASME
ASTM
SAE

▨ DATA STANDARDS

ANSI
MEMBERS:
COMPANIES, GOV'T OFF
(BCS, NBS, ETC.)
TRADE ASSOCIATIONS
(CBEMA, EIA, ETC.)
PROFESSIONAL SOCIETIES
(IEEE, ACM, ASME, ETC.)

PARTIAL LIST OF COMMITTEES
B MECHANICAL
C ELECTRICAL/ELECTRONICS
MH MATERIALS HANDLING
T1 TELECOMMUNICATIONS
W WELDING
X INFORMATION SYSTEMS
X3 INFORMATION PROCESSING
X9 FINANCIAL SERVICES
X12 ELEC BUS DATA INTERCH
Y DRAWINGS, SYMBOLS, ABBR
Y14 GRAPHICS INTERCHANGE (IGES/PDES)

IGES/PDES

FEDERAL STANDARDS AND SPECIFICATIONS

DEPT. OF DEFENSE
CALS
DARPA (TCP/IP)

DEPT. OF COMMERCE
NBS

OFFICE OF PRODUCT STANDARDS POLICY

NEL
CME
CALS
IGES/PDES
AMRF (IMDAS)

FIPS
ICST
SIG/UG OSI CCITT X.400 ISDN CALS
CCSE SNA

DATA STANDARDS COORDINATION
PROPOSED DEFINITION FOR "DATA STANDARDS"

Data ISO The representation forms of information dealt with by information systems and users thereof. (doc)

ANS
1. A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automatic means. (ISO definition)
2. Any representations such as characters or analog quantities to which meaning is or might be assigned.

Data Standards Those standards affecting the integrity of the content and semantics of data elements in all their system (not application) and network forms: archiving, storage, shared data bases, processing, conversion, translation, and both internal and external exchange.

Information **ANS** The meaning that a human assigns to data by means of known conventions used in their representation. (ISO definition)

Product Data The elements defined for product definition data as well as such details as assembly instructions, process specifications, financial data, customer services information, quality assurance data and testing results. This is not an inclusive list. (TOP 3.0)

Product Definition Data A subset of product data that includes only those data elements necessary for the analysis, design, manufacture and test of a product.

C 97 Study Committees (SC)

1. Vocabulary
2. Character Sets & Info. Coding
3. APT
4.
5.
6. Data Communications
7. Design & Doc of Info Sys
8. Numerical Control
9. PL/Numerical Control
10. Magnetic Disks
11. Flexible Magnetic Media
12. Instrumentation Tape
13. Interconnection of Equipment
14. Representation of Data Element
15. Labelling & File Structure
16. Open Systems
17. ID/Credit Cards
18. Text Prepration & Interchange
19. Office Equip & Supplies
20. Data Encryption
21. OSI Support Services, IRDS
22. Programming Languages
23. Optical Digital Data Disks

The following list identifies national data standards development committees for information processing:

- T1 TELECOMMUNICATIONS (FORMERLY FCC)
- X3 INFORMATION PROCESSING SYSTEMS
  - X3H2 DATABASE
  - X3H3 GRAPHICS (DISPLAY)
  - X3H4 IRDS (DATA DICTIONARY SYSTEM)
  - X3K5 ANDIPS (DICIONARY OF TERMS)
  - X3L2 CODES AND CHARACTERS
  - X3L8 DATA REPRESENTATION
  - X3S3 DATA COMMUNICATIONS
  - X3T1 DATA ENCRYPTION
  - X3T2 DATA INTERCHANGE
  - X3T5 OPEN SYSTEMS INTERCONNECTION
  - X3V1 TEXT: PUBLICATION SYSTEMS
- X9 FINANCIAL DATA INTERCHANGE
- X12 BUSINESS DATA INTERCHANGE
  - X12A NEW TRANSACTIONS
  - X12C COMMUNICATIONS (X.400)
    - PROJECT TEAMS
- Y14.26 DIGITAL PRODUCT DATA REP (IGES/PDES)

Figures 10 and 11 chart these time intervals for two cases

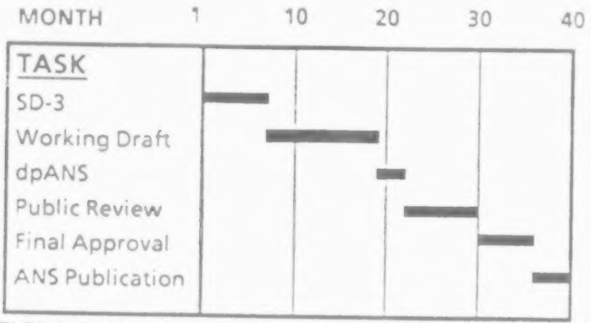


FIGURE 10 ANSI PROCESS (Optimistic Times)

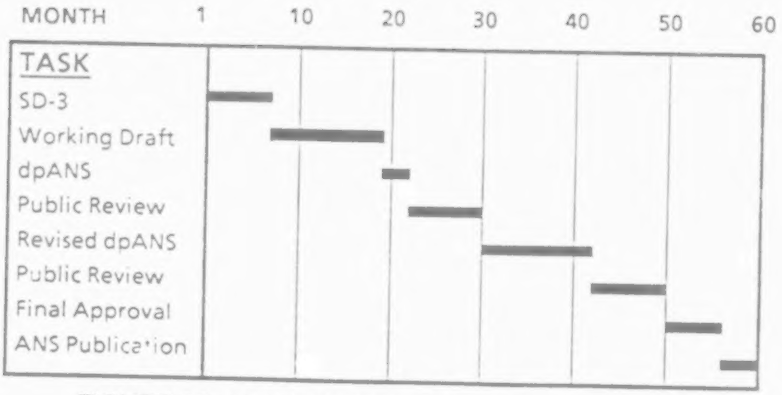


FIGURE 11 ANSI PROCESS (More Typical Times)

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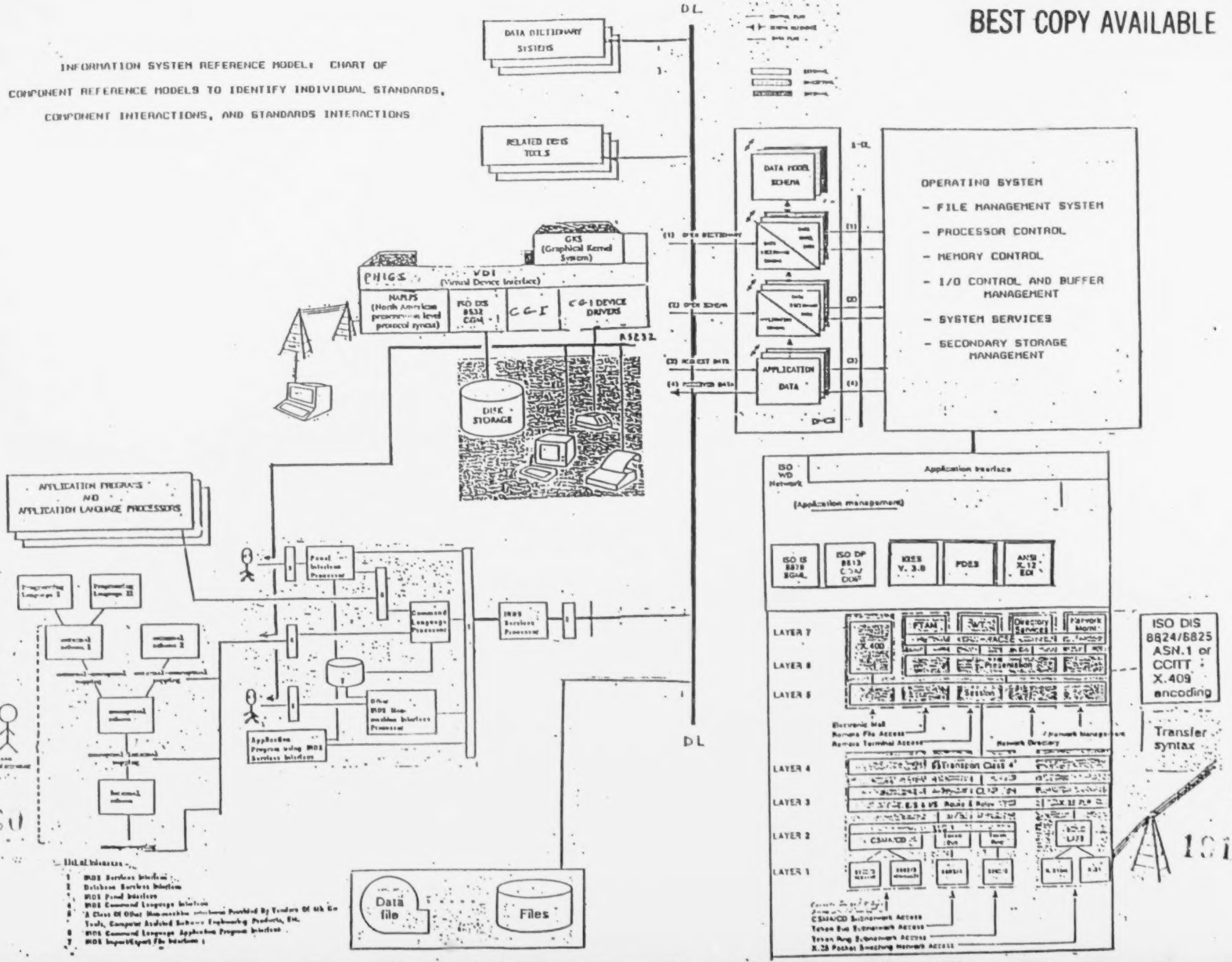
INFORMATION SYSTEM REFERENCE MODEL: CHART OF COMPONENT REFERENCE MODELS TO IDENTIFY INDIVIDUAL STANDARDS, COMPONENT INTERACTIONS, AND STANDARDS INTERACTIONS


DL
DATA DICTIONARY SYSTEMS
RELATED DBMS TOOLS
DATA MODEL SCHEMA
APPLICATION DATA
DBMS
(1)
(2)
(3)
(4)
OPERATING SYSTEM
- FILE MANAGEMENT SYSTEM
- PROCESSOR CONTROL
- MEMORY CONTROL
- I/O CONTROL AND BUFFER MANAGEMENT
- SYSTEM SERVICES
- SECONDARY STORAGE MANAGEMENT
GKS (Graphical Kernel System)
PHIGS
VDI (Virtual Device Interface)
NAPLPS (North American presentation level protocol syntax)
ISO DIS 8632 CGM
CGI
CGI DEVICE DRIVERS
RS232
DISK STORAGE
APPLICATION PROGRAMS AND APPLICATION LANGUAGE PROCESSORS
Programming Language I
Programming Language II
external schema 1
external schema 2
external-conceptual mapping
conceptual schema
conceptual-internal mapping
internal schema
storage mapping
Database Administrator
Panel Interface Processor
Command Language Processor
IRDS Services Processor
Other IRDS Non-machine Interface Processor
Application Program using IRDS Services Interface
List of Interfaces
1 IRDS Services Interface
2 Database Services Interface
3 IRDS Panel Interface
4 IRDS Command Language Interface
5 A Class Of Other Non-machine Interfaces Provided By Vendors Of 4th Gen Tools, Computer Assisted Software Engineering Products, Etc.
6 IRDS Command Language Application Program Interface
7 IRDS Import/Export File Interface
Data file
Files
ISO WD Network
Application Interface
(Application management)
ISO IS 8879 SGML
ISO DP 8613 ODA/ODIF
IGES V. 3.0
PDES
ANSI X.12 EDI
LAYER 7
LAYER 6
LAYER 5
LAYER 4
LAYER 3
LAYER 2
LAYER 1
X.400
FTAM
VT
Directory Services
Network Mgmt
ACSE
Presentation
Session
Transport Class 4
CLNP
CSMA/CD
Token Bus
Token Ring
LAPB
X.21bis
X.21
Electronic Mail
Remote File Access
Remote Terminal Access
Network Directory
Network Management
CSMA/CD Subnetwork Access
Token Bus Subnetwork Access
Token Ring Subnetwork Access
X.25 Packet Switching Network Access
ISO DIS 8824/8825 ASN.1 or CCITT X.409 encoding
Transfer syntax

VANDERWILT 10-30-87

COMPUTER INTEGRATED ENTERPRISE

BUSINESS • MANAGEMENT • PRODUCT LIFE-CYCLE

CALS

6. FINE-TUNE SYSTEM AND DATA INTEGRATION, DECISION SUPPORT, FORCASTING, AND PLANNING

PRODUCT DATA BASES DBMS, DICTIONARY, AND TOOLS

BUSINESS MODELS AND DATA MODELS

GOVERNMENT PRODUCT DATA WORLD-WIDE

5. PLAN SPECIFIC COMPONENT INSTALLATION FOR MINIMUM IMPACT AND MAXIMUM BENEFIT

COMPUTER SYSTEMS AND NETWORKS

INTERFACES AND DATA MANAGEMENT TOOLS

4. APPROVE PROCEDURES FOR PLANNING SYSTEM INSTALLATIONS THROUGH MIGRATION AND EVOLUTION TOWARD INTEGRATION

DATA AND SYSTEM TIME CONTRAINTS, IMPACTS, AND BENEFITS

DATA MANAGEMENT FEASIBILITY, IMPACTS AND BENEFITS

GOVERNMENT CONTRACT REQUIREMENTS

CONTRACT

<--------------------->

CONFORMANCE

3. AUTHORIZE IMPLEMENTATION SPECIFICATIONS FOR COMPONENT PROFILES; IMPOSE CONFIGURATION CONTROL

INFORMATION SYSTEM COMPONENTS

DATA BASE AND DATA MANAGEMENT COMPONENTS

GOVERNMENT IMPLEMENTATION PROFILES

(ENTERPRISE DATA STANDARDS INSTALLATION)

===

(ENTERPRISE PARTICIPATION IN STANDARDS DEVELOPMENT)

2. DEFINE, TEST, EVALUATE, AND VALIDATE SYSTEM COMPONENT PROFILES

SPECIFICATIONS FOR SYSTEM COMPONENT PROFILES OF DATA STANDARDS

VALIDATION OF SYSTEM COMPONENT PROFILES

SPECIFICATIONS FOR DATA MODELING COMPONENT PROFILES

DATA ELEMENT APPROVAL AND DATABASE DESIGN

GOVERNMENT TEST PROJECTS

ANALYSIS AND TECHNOLOGY EXCHANGE FOR INTERACTIVE INTEGRITY OF DATA STANDARDS

OPEN INFORMATION NETWORK FOR EVALUTATION, FORUMS, TECHNOLOGY EXCHANGE, CALENDAR, AND OTHER STANDARDS COMMUNICATIONS

1. DEVELOP AND APPROVE INDIVIDUAL DATA STANDARDS (ISO/ANSI)

SDO/ASC SUBGROUP DATA STANDARDS DEVELOPMENT

SYSTEM REFERENCE MODELS TO DEFINE COMPONENTS AND ROLES OF INDIVIDUAL DATA STANDARDS

DATA ANALYSIS AND DATA MODELING

FIPS AND MIL-SPECS/ STANDARDS

______________/ ____/

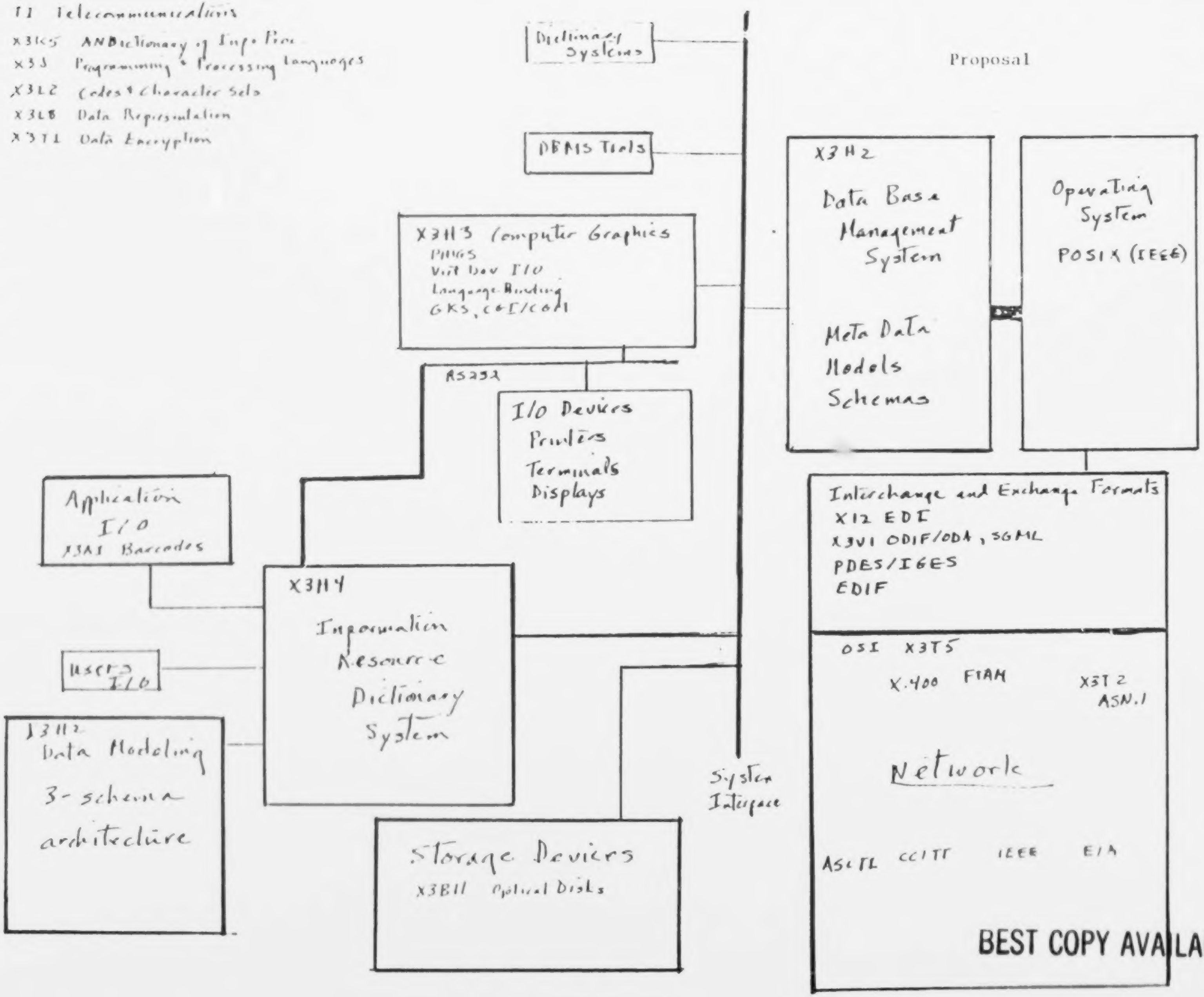
BUILDING STEPS

BUILDING BLOCKS

BUILDING PRODUCT DATA INTEGRATION BASED ON ISO/ANSI STANDARDS

Proposal

T1 Telecommunications
X3K5 ANDictionary of Info Proc
X3J Programming + Processing Languages
X3L2 Codes + Character Sets
X3L8 Data Representation
X3T1 Data Encryption


Dictionary Systems
DBMS Tools
X3H3 Computer Graphics
PHIGS
Virt Dev I/O
Language Binding
GKS, CGI/CGM
RS232
I/O Devices
Printers
Terminals
Displays
Application I/O
X3A1 Barcodes
X3H4
Information Resource Dictionary System
Users I/O
X3H2
Data Modeling
3-schema architecture
Storage Devices
X3B11 Optical Disks
System Interface
X3H2
Data Base Management System
Meta Data
Models
Schemas
Operating System
POSIX (IEEE)
Interchange and Exchange Formats
X12 EDI
X3V1 ODIF/ODA, SGML
PDES/IGES
EDIF
OSI X3T5
X.400 FTAM
X3T2
ASN.1
Network
ASCTL CCITT IEEE EIA

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Closing Remarks

Frank Carr

General Services Administration

Summary of Closing Remarks

Frank Carr

I'm just going to take a few minutes to give you a few additional thought reactions to today's session. I think, first of all that we owe a lot to the speakers. They've done an excellent job in covering the subject. I think that we've accomplished the main purposes of the session.

Sitting here I kept thinking about the missing person in the audience, and I'll call that person the manager-user and what the manager-user reaction might be. The end user computing, the micros that have been introduced into the Federal government have made manager-users much more aware of what the possibilities are. The manager-user has a great interest in what I'll call the high growth area of information technology, namely the PCs, the work stations, and is particularly interested in multi-user systems and being able to link systems to each other. The manager-user has one picture in his mind of standards, and that is that standards are lagging the users needs. I think the chart that showed a four-year to five-year standards development time and many of the examples covered today illustrate what the problem is. There was one speaker who used a phrase which to my mind epitomizes a view of the standards-making process, which is "the check is in the mail." That's great if you don't have to go out and buy bread and butter and milk. I have used another phrase which has been "too little, too late." I'm going to switch to "the check is in the mail" because I think it's a little more diplomatic.

What can the user do? I think what we're going to see is a lot of emphasis on what are the strategies that users will have to adopt in the absence of standards, or while waiting for those standards to arrive?

The Federal government spends something over $30,000,000,000 annually in ADP and telecommunications. They are going to spend that money whether standards are here or are not here. The real issue that standards makers have to face is "are they going to be relevant to those procurements?" Just as users are going to have to address the issue of "what strategies do we follow in the absence of standards?" The standards makers maybe ought to get themselves together and begin to ask themselves what are the strategies that they're using in the standards development process, and should their strategies change? There is more than one way of approaching the standards making, and that might, in fact, be an expedited process.

With that, I've already indicated my appreciation to the speakers for the job they've done, and I thank everybody in the audience for being here.

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